THE DAILY NEWS PRESENTS THIS BOOK COVER

To Mabel L. Stirz

Of the Christian Day *School*

A good book is a good friend, and is deserving of respect and good will. This book is your friend—give it good care.

Next to a good book comes a good newspaper.

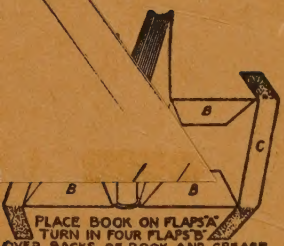
Did you ever stop to think what we should do without newspapers? They tell us what happens, at home and abroad, day by day.

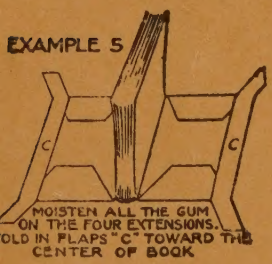
They keep us informed about people, events and things.

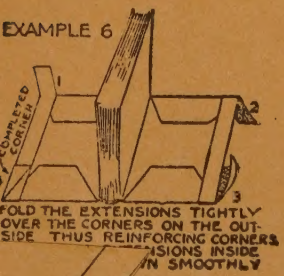
They make it possible for us to think and act understandingly about the most important concerns of daily life.

They are the source of the information which qualifies us for intelligent and profitable association with our fellow-men, at home and abroad.

How important, then, that the newspaper of your choice be entitled to your confidence when you select it as "guide, philosopher and friend."







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FOR INTERMEDIATE CLASSES

POPULAR SCIENCE READER

CONTAINING

LESSONS AND SELECTIONS

IN

NATURAL PHILOSOPHY

BOTANY, AND

NATURAL HISTORY

WITH

BLACKBOARD DRAWING AND WRITTEN EXERCISES

BY JAMES MONTEITH

AUTHOR OF GEOGRAPHIES, WALL MAPS, A PICTORIAL CHART OF GEOGRAPHY
HISTORY OF THE UNITED STATES, AND EASY LESSONS IN POPULAR SCIENCE.

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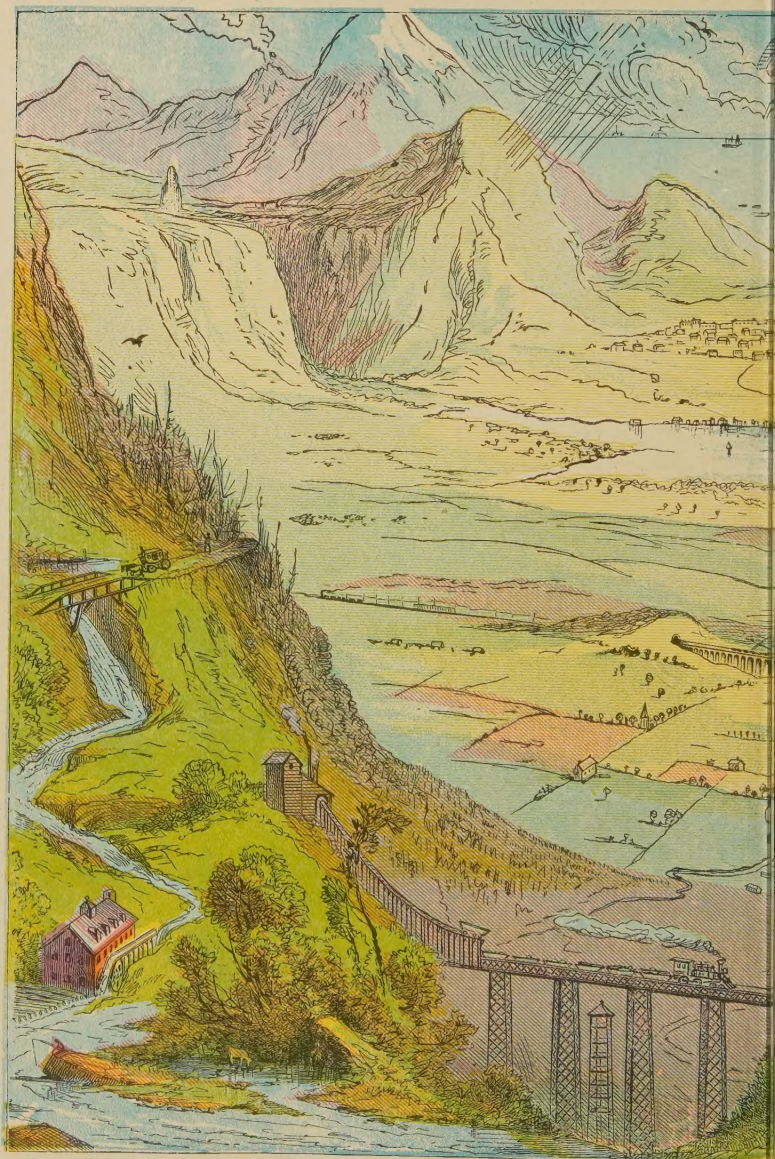

What may be found on

Mountain Stream. Mining Town. Spring. Cape and Lighthouse. Vapor ris
Mountain Lake. Chute or Shoot. Cañon. Canal and Locks. Mill and
Strait. Rain. Railroad Tunnel. Rapids. Gulf or Bay. Mine and
Lakes at different elevations. Village and

Picture? *Point to each.*

om the Ocean.
rwheel.
ne House.
ension Bridge.

Ocean.
Waterfall.
Channel.

Watershed on which is Windmill.
Promontory and Lighthouse.
Reservoir and Tower near bridge.
Foundries and Manufactories.

Peninsula.
Mountains.
Volcano.

Isthmus.
Geyser.
Islands.

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1. **They are a decided departure** from the ordinary school reader.
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LESSONS AND READINGS.

I. WHAT IS NOBLE?

WHAT is noble?—To inherit
Wealth, estate, and proud degree?—
There must be some other merit
Higher yet than these for me!—
Something greater far must enter
Into life's majestic span,
Fitted to create and center
True nobility in man.

What is noble?—'tis the finer
Portion of our mind and heart,
Link'd to something still divi'ner
Than mere lan'guage can impart:
Ever prompting—ever seeing
Some improvement yet to plan;
To uplift our fellow being,
And, like man, to feel for man.

What is noble?—Is the sabre
Nobler than the humble spade?—
There's a dignity in labor
Truer than ê'er pomp arrayed!
He who seeks the Mind's improvement
Aids the world, in aiding Mind!
Every great commanding movement
Serves not one, but all mankind.

O'er the forge's heat and ashes,—
  O'er the engine's[1] iron head,—
Where the rapid shuttle flashes,
  And the spindle whirls its thread:
There is labor, lowly tending
  Each requirement of the hour,—
There is genius, still extending
  Science and its world of power!

'Mid the dust, and speed, and clamor
  Of the loom-shed and the mill;
'Midst the clink of wheel and hammer,
  Great results are growing still!
Though too oft, by fashion's creatures,
  Work and workers may be blamed,
Commerce need not hide its features,—
  In'dustry is not ashamed!

What is noble?—That which places
  Truth in its enfranchised[2] will,
Leaving steps like angel-traces,
  That mankind may follow still!
E'en though scorn's malignant glances
  Prove him *poorest* of his clan,
He's the *Noble*—who advances
  Freedom and the cause of man!

SWAIN.

CHARLES SWAIN, an English poet, born in 1803. He learned the business of dyeing, and afterwards became an engraver, then author and poet.

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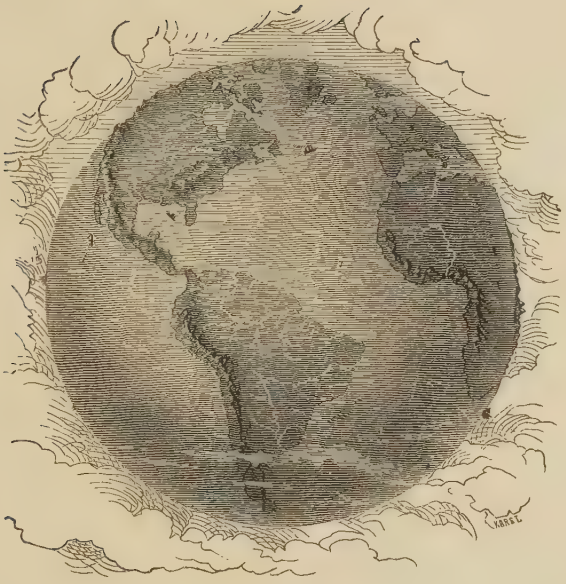
[1] Engine's, *en'gins.* [2] Enfranchised, *en-fran'chised.*



II. THE WORLD WE LIVE IN.

IF you should take a long walk from the city, town, or village in which you live, you might see people, houses, streets, roads, fields, trees, streams, ponds, mills, factories, besides horses, cows, sheep, and other animals; perhaps you would see a part of the ocean, on which great ships and steamers sail.

2. The **ocean** and **fields** are parts of the earth's **surface.** People, animals, trees, houses, ships, etc.,[1] are *on* the surface. When you see

[1] Etc., *et cet'erä*, and other things.

flies on an orange, you may say they are on its surface or outside part, just as people and animals are on the **surface** of the earth, which is round like an orange.

3. When you look upwards and around you, you may see the sky, the sun, and, perhaps, clouds; at night, you may see the moon and stars, and other bodies called planets, which look like stars.

4. All this time you are breathing—what? *Air.* Without air you could not live, nor could any animal, bird, or fish, or tree live. Sometimes the air is still, sometimes it moves gently, and you are able to fly your kite; then, again, it rushes powerfully and fearfully, blowing down trees, fences, and houses, and sinking ships.

5. This we call wind. You feel the air, you breathe it, you see the effects of the wind, yet you have never seen air or wind. You admit that there is air and that there is wind, although both are invisible. What does invisible mean? Are houses and trees visible or invisible?

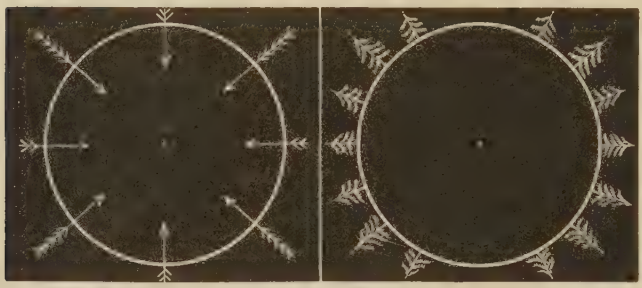
6. Now, as the earth is round (or very nearly so) like a great ball, and people travel or sail around on every part of it, what is it that keeps them from falling off from this great ball called the earth or the globe? It is something that is both useful and powerful. It is also invisible.

7. When you throw your ball high in the air, it is brought back again by something which you cannot see, by this other invisible power; without this power your ball would never come back to you.

8. When chestnuts are ripe, and when you throw a stone into an apple-tree in the autumn, the chestnuts and apples are brought to the ground by this same invisible power. Do you know what we call it? *Attraction.*

9. Without this attraction which the earth has, those chestnuts and apples would be as likely to fly away toward the moon or the sun or some of the stars; the farmer could not sow his seed, for it would be as likely to fly toward the clouds as to fall on the ground; the carpenter and the mason would not be able to keep their boards and bricks just where they wanted them; the chairs, tables, and beds in your houses would be as likely to rest against the ceiling as on the floor; and your sleds would no longer rush down hill on the smooth snow in winter.

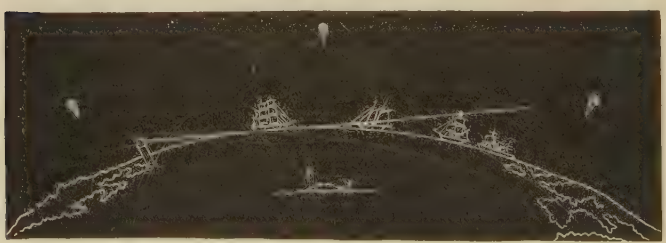
10. Now, a knowledge of all such things, as well as of different countries, mountains, and places on the earth, and of the wonderful fitness of them for people's enjoyment and welfare, may be obtained by studying geography.



Blackboard drawing to illustrate Up and Down. The teacher may draw by means of a piece of cord twelve inches in length a circle to represent the earth. On it mark arrows as shown in model, all pointing to the center, and, consequently, Downward; then mark other arrows pointing from the center, or Upward.

Another circle may be similarly drawn, and on it trees be represented all pointing Upward. The directions to and from the center, or down and up, should be clearly explained to the class.

11. When we look at the sun, moon, and stars, we see they are round; and if there are people living on the moon now, they would look at this world or earth and see that it too is round.



Blackboard drawing to show Rotundity of the Earth. With chalk and a cord two feet long describe an arc as here shown. On the left draw a part of the coast of North Amer-

ica, with a lighthouse on Newfoundland; on the right, England, Ireland, and the coasts of Europe and Africa. From the top of the lighthouse draw a straight line touching the Arc or Surface of the Earth; then show ships on the Atlantic in different positions, one below the horizon, another partly above, and another wholly above it. The straight line is the Line of Vision to a man in the lighthouse, and the point where that line touches the arc or surface shows the extent of his Horizon. The lighthouse and masts all point from the center of the Earth.[1]

12. The earth is larger than the moon, the sun is larger than the earth, and some of the stars are larger than the sun.

13. The earth moves around the sun, and the moon moves around the earth.[2]

14. If the earth did not move or revolve around the sun, we should have no change of seasons.

15. The earth has another motion: it turns around as a top spins, or as you might turn an apple around on a knitting-needle. This kind of turning is called rotation, and causes change from day to night, and from night to day.

16. You may see from this picture[3] how day and night are caused. The lamp represents the sun, and the apple represents the earth. The sun gives light to that side of the earth which is opposite it, as is shown by the bright side of

[1] Men have proved the earth to be spherical, or round like a ball, by sailing around it, and by observing that the hull or body of a distant ship coming toward them is not seen as soon as its topmast.

[2] To explain these motions, one of the pupils may represent the sun, another walk around him to represent the earth, and a third walk around the second, to represent the moon.

[3] Pict'ure, not pik'ter.

the apple, which represents day. The side turned away from the sun is dark—there it is night. If the earth did not turn or ro'tate on its axis we would not have night and day as we now have them.

To be drawn on the blackboard to explain the succession of Day and Night. The lamp represents the Sun; the apple, the Earth; the needle on which the apple turns represents the Axis of the Earth.

17. When you say the sun rises in the east in the morning,[1] it only appears to rise. It is not the sun which moves from the east upward and nearly over your head, and then down in the west in the evening. It only *appears* to do so. It is really the earth, or that part of it on which we live, that moves around the other way, toward the sun in the morning, and away from it in the afternoon; that is, from the west over to the east. When you are on a steamboat sail-

[1] Morning, *morn'ing*, not *mornin.*

ing swiftly and smoothly, the trees on the shore appear to move toward you, then past and behind you, yet you know it is the steamboat that moves—not the trees.

18. Without the sun we should have no heat or light. Would we not have wood to burn and give us light? We would not; for without the sun's heat trees would not grow. Would we not have the moon to shine for us? No, the moon would not give us light, for it is the sun's light on the moon that makes it bright and gives us moonlight nights. So, without the sun, there would be no light on the earth—no plants, trees, animals, birds, fishes, or people.

19. You have learned how important are the sun, air, and attraction. You will soon learn about rain, how it depends upon the sun, air, and winds, and how they all work together beautifully and continually in order that all people may have food to eat, water to drink, and pleasant places to live in.

20. Suppose you should start some pleasant morning in a *balloon* that could move all the way around the world before dark the same day. Of course, that has never been done, for the distance is too great, but suppose it could be done. What would you see? Well, you would glide over an immense portion of land,

Inside a flour mill.

called a continent. On this continent you would see **mountains, hills, valleys, rivers, lakes, farms,** and **trees.**

21. You might see men at work in the fields, others building houses, or bridges, or railroads; some busy in great factories[1] and mills making cloth, shoes, flour, tools, wagons, and other things too numerous to mention. Here and there you would see cities, towns, and villages, and, beyond them, farm-houses, barns, etc., at intervals; then, perhaps, a forest, a wilderness[2] or wild place, inhabited only by Indians and wild animals; then, again, beautiful valleys, plains, streams, and busy towns; and all at once you might

[1] **Factories,** *fak'to-reez,* not *fak'trees.*

[2] **Wilderness,** *wil'der-nes,* not *nis.*

come to a body of water which extends much further than your eye could reach. That great body of water is an **ocean.**

22. In the ocean, dotted here and there, you might see islands, which also contain trees, hills, lakes, people, birds, animals, etc., all different in appearance from any you had seen before; and you would wonder to find that, as you rush so rapidly over land and sea, some places have clear weather; others, cloudy; and still others rainy or stormy, all in the same day.

23. After your return home, which you would be sure to reach if your balloon kept in the precise course it started out on, you would, probably, sit down and write about all the places, people, etc., you saw: and, for the instruction and pleasure of those boys and girls who were unable to take such a voyage, you would, perhaps, fill a book with your description: that would be geography,[1] which is simply a description of the earth's surface.

---

[1] **Geography,** *ge-og'rah-fe,* not *gog'rah-fe.*

Questions which the teacher may ask.—Point to the earth's surface:—When do you touch it? Is the bottom of a well above or below the earth's surface? Mention something which is above the surface. Point towards the center of the earth. Point up—down. Why does an apple fall from a tree to the ground? Name some of the benefits which we derive from the air,—from the sun,—from attraction.

All words in the lesson printed in heavy, black type indicate that those places or objects are illustrated on the chart in front of the book, or are shown on the maps in their geographies.

III. WIND—MISTS—DAYBREAK.

WIND came up out of the sea,
And said, "O mists, make room for me!

It hailed the ships, and cried, "Sail on,
Ye mariners, the night is gone."

And hurried landward far away,
Crying, "Awake! it is the day."

It said unto the forest, "Shout!
Hang all your leafy banners out!"

It touched the wood-bird's folded wing,
And said, "O bird, awake and sing!"

And o'er the farms, "O chanticleer,
Your clarion blow; the day is near!"

It whispered to the fields of corn,
"Bow down, and hail the coming morn!

It shouted through the belfry[1]-tower,
"Awake, O bell! proclaim the hour."

It crossed the churchyard with a sigh,
And said, "Not yet! in quiet lie."

LONGFELLOW.

HENRY WADSWORTH LONGFELLOW, an American poet, born in Portland, Maine, in 1807. He graduated from Bowdoin College in which he afterwards became a professor.

---

[1] Belfry, *bĕl'fre.*

IV. THE OCEAN.

THE **Ocean**, often called the sea, covers three-fourths of the earth's surface. Its water is salt and in constant motion. In it live countless fishes, and on its surface very many **ships** sail from one country to another, carrying people, provisions, clothing, and various articles for use or ornament.

2. The ocean is useful to us not only in furnishing fish, and as a great highway for sailing ships and steamers. There are many boys and girls who have never seen the ocean, or eaten any of its fish, or seen anything that was brought in a ship. Lest they should think, therefore, that the ocean is of no use to them, and that it would have been better if the whole surface of the earth were laid out in pretty[1] fields, farms, and gardens, they should know that without the ocean no man, bird, or animal could live on the earth.

---

[1] **Pretty**, *prit'te*.

Have you ever seen an ocean? A mountain? A lake? A river? An island?

The teacher may ask the pupils to mention the different articles of food which people require. If the answer should be bread, then ask:

What is bread made of, and how? What is flour? Wheat ground in the mill. Where is wheat obtained? It is raised on a farm.

If others answer potatoes (*po-ta'toz* not *tuz*), apples, milk, beef, pork, etc., ask questions about each.

3. Animals live mostly upon grass, vegetables, or grain of some kind, which grow on the farms and in the fields.

4. The **rain** waters the fields and farms, fills streams, rivers, and lakes, and furnishes drink for men and cattle and all creatures[1] that live on the earth. When the vapor or moisture[2] in the air freezes, it falls in the form of snow. When the drops of rain freeze before they reach the ground, they fall in the form of hail.

5. From this you may readily understand how a certain drop of water may be changed to vapor, rise from the ocean, be carried by the winds far away and over the land, changed back to water, fall on the ground, sink down below the surface, find its way to a spring, reappear in the overflow, run down a hillside, and become part of a **rill, rivulet,**[3] **brook,** or other little stream. The stream flows on, falls over steep

---

[1] **Creatures,** *kreet'yoors.* [2] **Moisture,** *moist'yoor.*
[3] **Rivulet,** *riv'ū-let.*

Would the grass, grain, and vegetables grow without rain? Where does the rain come from? The clouds. Where do the clouds come from? The ocean. How? The heat of the sun causes vapor to rise from the ocean, and the wind blows the va'por or clouds over the land, and when they rise into high, cool air they fall in drops called rain.

What rises from the ocean? Va'por. What causes it to rise? The sun and air. What does vapor form? Clouds. What drives vapor or clouds over the land? The wind. What causes the clouds to return and fall in the form of rain? The coldness of the air above us. If you should ascend far above the earth's surface in a balloon or by traveling up a high mountain, what difference would you find in the air? We would find it cooler and cooler the higher we go.

places, forming **cascades** or **waterfalls,** turns **mill-wheels,** receives other **streams,** becomes deep enough and wide enough to float large **steamboats,** and at last finds its way into the ocean. Thus that little drop of water, after a long and curious journey, may return to the place it started from.

6. As the land on the earth's surface is higher than the ocean, you all know that the water of the ocean could not run *up and over* the land.

7. All of you who have seen a kettle[1] or pot of water boiling have noticed that something white, like smoke, rose from the top of the water. It was not smoke, but vapor. **Vapor** is the water so thinned out by heat as to become light enough to rise in the air. Have you not also seen the inside of windows[2] in cold weather all wet with drops? The vapor coming near the cold window is only changed back again to water.

8. If any of you should hold a cold substance, such as a pitcher filled with snow, or ice, or

---

[1] **Kettle,** *kĕt'tl* not *kit'tl.* [2] **Windows,** *win'dōz,* not *duz.*

Can people live without water? Does the water you drink come from a spring, well, lake, reservoir (*rez'er-vwor*), or river? From what is the well, spring, river, or lake supplied? Rain. From what does rain come? From what do clouds come?

Now, how do the waters which you find on the land, even on very high lands, such as springs, rivers, and lakes, get there? They are formed by rain or melting snow. Where do rain and snow come from? From vapor or clouds. Where do vapor and clouds come from? The ocean.

cold water, over boiling water, you would see the vapor rise, and as soon as it touched the cold surface of the pitcher it would be changed into drops. That is the way rain is formed.

9. Now if you should watch the vapor as it rises from the ocean, and is carried by the wind over the land, you might see it enter the air that is cooled by cold mountains. As cool air cannot hold as much vapor or moisture as warm, dry air, some of the moisture falls in the form of rain. That which falls on the land waters the fields and farms, and fills the streams and lakes. (*See chart on pages* 2 *and* 3.)

10. The ocean then, supplies or fills all the lakes, ponds, rivers, and streams; every drop of water on the surface or under the surface of the land, on the mountain[1] top or in the deepest valleys; all the water of the wells and springs; all the moisture which floats in the air; and all rain, snow, hail, or dew.

11. If you should boil a kettle of salt water, the vapor passing off would be fresh. This you

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[1] **Mountain,** *mount'in,* not *tane* or *ton.*

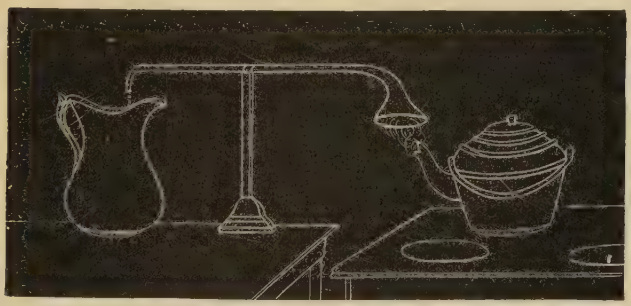
Is the water of the ocean salt or fresh? Salt. Is the water of rain, lakes, rivers, and snow salt or fresh? Fresh.

If these are all supplied from the salt ocean, why are they fresh? Because when vapor rises from the ocean, the salt, too heavy to rise, remains behind.

From what besides the ocean does vapor rise? From lakes, rivers, ponds, and wet ground.

Does vapor rise from a cup of water? It does.

may prove by conducting the vapor through a tube[1] or pipe cold enough to condense or change the vapor back again to water; this water will be fresh.



Drawing for the blackboard explaining evaporation and condensation; also, how fresh water may be procured from salt water, by conducting vapor through a pipe that is kept cold.

12. The changing of water into vapor is called evapora'tion. The changing of vapor into water is called condensa'tion.

13. The words ocean and sea are often used to refer to the whole body of salt water on the earth, which may be considered as divided into

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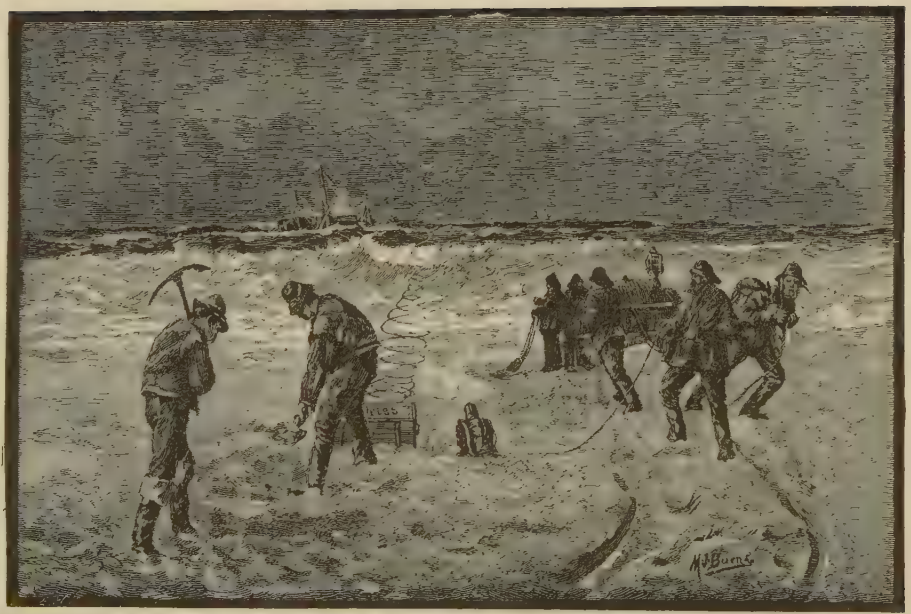
[1] **Tube,** *tūbe* **not** *toob.*

The teacher may now draw on the blackboard this picture, of a size sufficiently large to be seen by the whole class; or, the drawings which enter into a certain day's lesson may be previously prepared on the blackboard.

If you were at sea and without drinking-water, how could you obtain it? By boiling the salt water in a kettle and conducting the vapor into a cold pitcher or bowl, or through a pipe kept constantly cold. What becomes of the salt in the process of evaporation? It remains behind in the kettle.

Suppose that the salt should rise from the ocean with the vapor; what would the rain be, fresh or salt? If rain were salt, what effect would it have on our grass, trees, grain, and flowers?



The Ocean in a storm—Shipwreck—Wreckers working to save the passengers—A rope is sent over to the ship by means of a ball fired from a mortar and passed over poles erected on shore.

five parts, also called oceans. There are five oceans. Their names are **Pacific Ocean, Atlantic Ocean, Indian Ocean, Arctic Ocean, Antarctic Ocean.**

Signaling for Help.

14. If you should cross the ocean, you would see nothing about your ship but the water and the sky; and, as the vessel would cut through the great rolling waves, it would go up and down like a rocking-chair. In a storm, however, the waves rise terribly high and beat over the ship, which tumbles and plunges and rolls vi'olently,[1] sometimes nearly

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[1] **Violently,** *vi'o,* not *vi'a.*

Which of these would you cross in sailing from the United States to Europe? Why do steamships and other vessels cross the ocean? To carry passengers, also articles which are grown or manufactured here.

Do those vessels return empty? They bring back articles which are raised or made in Europe, Asia, or Africa; they bring passengers also.

Can you name some things which are sent from this country across the Atlantic Ocean? Flour, wheat, cotton, provisions, oil, and tobacco (*to-bak'ko* not *ka* or *ker*).

Can you mention some articles we receive from Europe? Materials for making dresses and all kinds of cloths, besides knives and toys.

What do ships from South America bring to this country? Coffee and India-rubber.

What do we get from China and Japan? Tea, fans, and many fancy articles.

How long does it take steamships to cross the Atlantic from this country to Europe? About ten days.

covered over with the waves. Then the passengers must go down stairs or they would be washed overboard. Besides this there is danger of one ship running into another at night or against an iceberg, or of the ship taking fire.

15. To capture whales men spend many months on long, cold voyages, and we frequently hear of ships being crushed by icebergs or by fields of ice, and the crews frozen or starved to death. All this is for what purpose? *To get oil and whalebone from the whale.* When the whalemen see a whale they hurry out of their ship and row in open boats towards him, and when near enough, one of the men throws a kind of dart or spear, called a harpoon, with all his might into the whale. The huge

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Did you ever see a steamship? What is the difference between a steamship and a sailing vessel?

What is an iceberg? A great mass of floating ice reaching far above and below the surface of the water. Icebergs come from the cold regions of the Arctic Ocean and northern parts of North America.

Do men ever sail into these cold dangerous regions, where they are constantly surrounded by ice and icebergs? They do. Why? To find a new passage across the Arctic Ocean, or to reach the most northerly part of the earth, called the North Pole.

What dangers attend these voyages? Some ships have been crushed by fields of ice or by icebergs, and the crews perished from hunger and cold. Mention a celebrated English explorer who was lost in the Arctic regions? Sir John Franklin.

In 1845, Sir John Franklin left England with two ships and fine crews, to reach Asia (*a'she-ä*) by way of Baffin Bay and the Arctic Ocean. Himself, his officers and crew of over 130 men, all perished.

How do natives and explorers in the Arctic regions travel over the ice and snow? In sledges drawn by dogs.

What huge animals (often, but improperly, called fish) are captured in the water of the cold regions? Whales. You can know them far off by the two fountains or streams of water which they blow into the air.

creature becomes furious, and the men must look sharp to keep out of his way and to let out the long rope which is fastened to the harpoon, else their boat may be dashed to pieces or pulled far under the water in an instant.

16. Many whales are killed by means of harpoons and bombs fired from cannons which the ships carry with them. When a ship arrives in the vicinity of a whaling ground, a lookout is stationed at the masthead. As soon as a whale is discovered, the boats are lowered and each crew exerts its utmost strength to reach him first. In the bow [1] sits the harpooner, who at the proper moment, seizes the harpoon with one hand and the coil of rope with the other; and as he nears or touches the whale, hurls his harpoon with all his strength and cries out "Stern all." The crew instantly backs the boat, and the whale in his terror plunges and dives with such velocity, that water must be constantly poured upon the rope to keep it from setting the boat on fire by its friction.[2] Every time the whale rises, which he must do at least once or twice every hour in order to breathe, the boats rush at him and the men strike him again and again with harpoons and lances.

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[1] **Bow,** *bou*, the prow or forward part of a ship or boat

[2] **Friction,** *frik'shun*, the act or effect of rubbing.

17. After a while the whale dies and floats at the top of the water. Then the men jump on him and cut out great quantities of the fat which is found right under the surface of the skin. They afterwards boil the fat, called blubber, and make it into oil, which they take home in barrels.[1]

18. The whalebone, which is obtained from the inside of the upper jaw, is colored and prepared for use. The whale is always in the water, and is the largest of all animals.

19. There is a very large animal called the wal'rus which lives in the Arctic regions and is always found on the coast very near the water. Walruses are excellent swimmers, but are very slow and awkward in their movements on shore. When disturbed they make loud roarings. Their length is about fifteen feet. They are captured for their tusks of ivory, their skin and fat. They often have terrific com'bats with white or polar bears. When suspecting an attack, they designate one or more of their number to act as guards while the others sleep. They defend themselves bravely, carrying off their helpless young or their wounded companions with their fore paws.[2]

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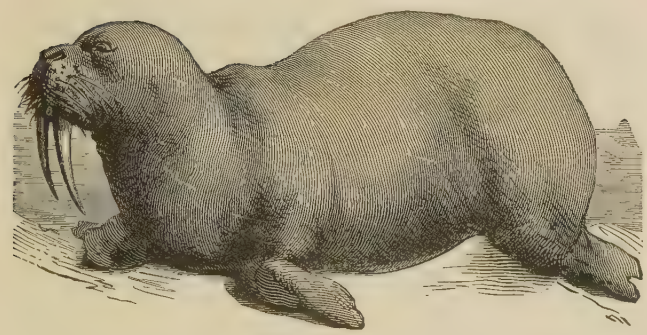
[1] **Barrel,** *băr'rel,* not *bärl.*

[2] **Paws,** *pawz,* not *paurz.*



The Walrus.

20. There are other animals called seals living in or near the water, which are captured in very large numbers every year in the cold regions.

21. The seal is about two yards long. It has two fore paws, with which it paddles in the water or pulls itself along on the ice or the shore. Its hinder[1] limbs serve only to steer and scull with. Its head resembles that of a dog.

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[1] **Hinder,** *hīn'der.*

For what is whalebone useful? How long do you think a whale is? The larger ones are about 20 to 30 yards long and 10 yards around the body.

Here show these distances by comparing with your school-house, room, or some other object.

Whales live mostly in the Arctic and Antarctic regions.

They usually come to the surface of the water about every ten minutes, remaining there about two minutes, during which they blow eight or nine times and then descend. They feed swimming just below the surface, with their huge mouths wide open. Often, the whole length of line let out is more than 1,200 feet. The thickness of their blubber is from 6 to 24 inches.

For what are seals captured? Their fur. After the long, coarse hairs are plucked out, the soft, short fur is dyed and then made into beautiful coats worn mostly by ladies.

Seals, when in the water, must come to the surface at least every half hour to breathe.

Seal, 6 feet in length. Porpoise, 6 to 8 feet in length. Shark, 12 feet in length.

Make blackboard drawing of seal and porpoise, each 2 feet long by 6 inches wide; of shark 4 feet long by 10 inches wide. The shark is twice as long as the seal, and the whale is five times as long as the shark. (One-third of actual length.)

22. In **Greenland,** where the cold is too severe for trees, plants, and fruits to grow as they do in our country, many of the people depend upon the seal for almost everything: its flesh they use for food, of its skin they make their clothing, tents, and boats, and its fat furnishes them with oil for fuel and light.

23. The seal is found on coasts and islands in many parts of the world, but especially in the cold regions. Around **Alaska, Greenland,** and **New'foundland** thousands are captured every year.

The seal is amphib'ious, because it can live in water or on land; it is quad'ruped, because it has four paws or legs; like the whale, it is carniv'orous, because it eats fish and the flesh of animals; it is grega'rious, because it lives with others, in herds; it is mi'gra-to-ry, because it moves from one part of the ocean to another; and it is a mam'mal, because it suckles its young.

Alaska was purchased from Russia by the United States for seven millions of dollars. It is noted for seals and fish.

24. The different species of the seal include the sea-lion, sea-elephant, sea-leopard, sea-bear, and the walrus.

25. The porpoise is very much like the seal. It is captured for its oil, flesh, and skin.

Spearing a Porpoise. Coast of Maine.

26. Cod, mack'er-el, herring, and hal'ibut are caught in immense numbers near the coasts of New England, Labrador, and Newfoundland. When salted and cured they are exported to nearly every part of the world.

Halibut, 4 feet in length. **Flying-fish, 6 inches.**
Sword-fish, 16 feet. **Mackerel, 15 inches.**

On the blackboard make the drawings full or life size.

27. On the shoals or shallow places are the banks of New'foundland, where, during several months in the year, you may see hundreds of boats and thousands of men of different nations, engaged in fishing.

28. A codfish of the ordinary size is about two feet in length. The mackerel is about 15 inches in length. It is caught by hook and line, and by a seine[1] or net. It is salted in barrels. The halibut is a larger fish, measuring from 3 to 6 feet in length. Curiously, both its eyes are on the same side of its head.

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[1] Seine, *seen.*

Abundant, also off the east coast of the United States, are the Spanish mackerel, blue-fish, and tile-fish, all valuable for food. The latter is a recent discovery. The menha'den is valuable for oil obtained from it.

In what part of North America is Greenland? Alaska? Newfoundland? Is Newfoundland surrounded by water? What is it, therefore? An island By what water is it surrounded? Mention other kinds of fishes.

29. Did you ever see flying fish? They are found in the **Mediterranean Sea,** the **Gulf of Mexico,**[1] and warm parts of the ocean. Their long fins enable them to fly out of the water as high as the decks of ships, on which they sometimes fall. Their length is about ten inches.

30. Another singular fish is the sword-fish, 12 to 20 feet in length. It is so fierce, and so swift in motion, that it drives its sword, a long, sharp, bony substance, into a fish which it wishes to capture. It has been known to attack a ship and bury its weapon[2] deep in the timbers.

31. Here is still another very curious fish. It is a cuttle-fish, which has eight long arms for seizing other creatures which it captures for food. When pursued, it discolors the water all about it with an inky substance, which enables it to conceal itself and escape from its enemy.[3]

32. Among the fish which men and boys delight to catch, are the pike and trout. The pike, which is about 2 feet long and 3 inches

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[1] The black faced type throughout the book are to remind pupils o find the places on the maps in their geographies.

[2] **Weapon,** *wĕp'on.* [3] **Enemy,** *ĕn'e-me,* not *en'a.*

The sword-fish is found in the Atlantic Ocean and the Mediterranean Sea.

Do fishes breathe air? They do. Do they come to the surface of the water for air, as whales, seals, and porpoises do? They do not. Where do they find air to breathe? In the water. Does all water contain air? It does. Fishes have gills; animals, lungs to breathe with. The blood of fishes is cold, while that of animals is warm. Where is the Mediterranean Sea? Gulf of Mexico?

Trout, 16 inches in length. **Pike, 2 feet.**
Codfish, 2 feet. **Cuttle-fish.**

wide, is caught in streams and lakes, and is delicious for the table. The trout av'erages about 16 inches in length. It is caught by hook and line in the streams of the New England, Middle, and Western States, and Canada. It is usually found in swiftly-running streams, swimming against the current.

33. A very fine fish which comes from the south in the spring, entering the rivers and inlets of the States along the Atlantic Coast, is the shad.

34. You may have seen enclosed in tin boxes and packed in olive[1] oil a great many very small fishes. Do you know their name? *Sardines.*[2] They are caught in large quantities in the Atlantic Ocean and the Mediterranean Sea.

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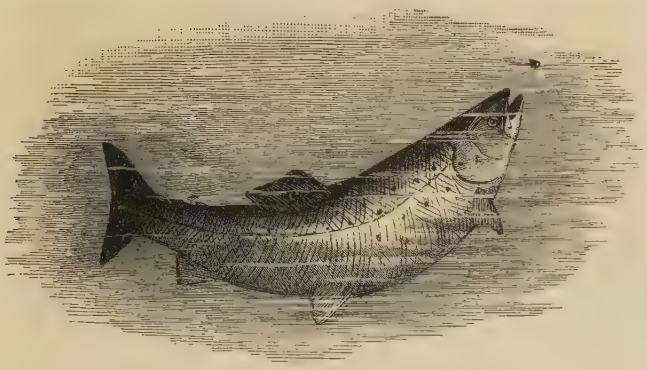
[1] **Olive,** *ŏl'iv*, an oil obtained from the fruit of the olive tree, which grows in warm climates.

[2] **Sardines,** *sär'deens*, so called from the island of Sardinia.



A Salmon.

35. Among the most highly prized of all the fishes, as an article of food, is the salmon.[1] Its flesh is eaten fresh, salted, dried, and pickled.[2] It is found in the northern waters of North America, Europe, and Asia, from which it enters the rivers, ascending during a flood, at the rate of 25 miles a day. It is remarkable for its strength and perseverance in surmounting cascades; in doing this, it has been known to spring 14 feet out of the water and to describe a curve of over 20 feet in length.

36. Many streams of **Can'ada** abound with salmon, and the fisheries on the Columbia River, north of **Oregon**, are the most profitable in the world.

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[1] Salmon, *săm'un.*

[2] Pickled, *pĭk'ld*, preserved in salt, vinegar, water, and sometimes seasoned with spices.

Indians Spearing Salmon on the Columbia River.

37. The length of a salmon is about three feet, but sometimes one is caught weighing 60 or 70 pounds, which is very much larger.

38. There is a kind of fish found or caught in salt water called shell-fish, such as oysters, clams, crabs, and lobsters. These are found near the shore in great quantities. Oysters are usually found adhering to rocks or in the sand in salt water. Do any of you know what kind of a jewel, worn extensively by ladies, is found in some oysters? *The pearl.*

39. Pearls are obtained by divers. Divers do not always go down head first. Sometimes one is lowered by a rope, on the end of which a stone is fastened to help him to sink. With his feet upon this stone and one hand holding on to the rope, the diver collects as many of the pearl-oysters as he can in a minute or half-minute, when he must ascend to breathe.

40. There are pretty ornaments made from the skeletons or kind of bony substance of small creatures which have died in the ocean in such large numbers as gradually to form islands. What is that substance? *Cor'al.* This is also obtained by divers. The finest is of a rose-pink color, and is found chiefly near **Italy.**

41. Sponge is also the skeletons of what were once living creatures. It is very soft, and it adheres to rocks, shells, etc., under water. It looks like a sea plant.

Pearls are beautiful and expensive, especially those as large as peas and larger. Philip II., King of Spain, had one which was valued at $75,000, and it is said that those in the ear-drops of Cleopatra, the celebrated Queen of Egypt, were valued at $400,000.

Among the most famous pearl fisheries are those near Ceylon and the east coast of Hindoostan'. Pearls have been found also near Japan, Java, Sumatra, and in the Persian Gulf and the Bay of Panama.'

Mother-of-pearl is the inside lining of the shells. It is extensively used for making buttons, knife-handles, and for ornamenting boxes, furniture, etc.

A flourishing business has long been carried on in the manufacture and sale of coral ornaments in the Italian cities of Naples, Leghorn', and Gen'oa.

These divers for pearls and corals, when in the water, often see curious and frightful creatures, some of which are very dangerous.

For what is sponge useful? Pieces of sponge, coral, and whalebone may be shown to the class.

V. A TEMPEST AT SEA.

Ship in Distress.—Passengers Rescued.

By means of a rope fired from a mortar or cannon, as shown on page 24, and fastened to the ship, a kind of rope suspension bridge is established. With the aid of this rope, passengers are brought safely ashore.

THE sky was perfectly serene; there was nothing but a few coppery clouds, like reddish vapor, to be seen, which scudded across the heavens faster than a bird could fly. But the sea was furrowed by five or six long, high waves, like a chain of hills separated by broad, deep valleys.

2. The wind blew the summits of these waves into foam; most to be dreaded were the overhanging heads of these waves, which, pushed forward by the force of the wind, rolled back thundering and foaming, ready to engulf the largest vessel if it should come within their reach. The condition of our ship, together with that of the sea, rendered our situation frightful.

3. The main-mast had been shattered by lightning in the night, and the miz'zen-mast, on which was our only sail, had been carried away by the wind in the morning. The vessel no longer obeying the helm,[1] floated at the mercy of the wind and wave.

4. I was on the quarter-deck, clinging to the mizzen shrouds, endeavoring to realize the terrible spectacle. When we approached one of these mountain waves, the summit was on a level with our top'-masts, that is, more than fifty feet above our heads.

5. When the base of this frightful wall passed under our vessel, it careen'ed until the main yards were half under the water, which reached to the foot of the mast, and we were on the verge of foundering. And when rising on the crest of the wave, it righted again suddenly, only to descend on the other side, the danger was not lessened, and the water rushed beneath the vessel as swiftly as through a sluice,[2] like a sheet of foam.

6. We could neither give, nor receive, the consolations of friendship. The violence of the wind was so great, that not a word could be heard, even though

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[1] **Helm,** *hĕlm*, not *hel'lem*.

[2] **Sluice,** *sloos*.

shouted directly in the ear. The air carried away our voices, and nothing could be distinguished but the sharp whistling[1] of the wind through the yards and rigging, and the booming of the waves, which resembled the howlings of ferocious beasts. Thus we hovered between life and death, from sunrise to sunset.

"HARMONIES OF NATURE."

VI. THE RAINY DAY.

THE day is cold, and dark, and dreary;
It rains, and the wind is never weary;
The vine still clings to the moldering wall.
But at every gust the dead leaves fall,
And the day is dark and dreary.

My life is cold, and dark, and dreary;
It rains, and the wind is never weary;
My thoughts still cling to the moldering past,
But the hopes of youth fall thick in the blast,
And the days are dark and dreary.

Be still, sad heart! and cease repining;
Behind the clouds is the sun still shining;
Thy fate is the common fate of all,
Into each life some rain must fall,
Some days must be dark and dreary.

LONGFELLOW.

[1] **Whistling,** *whis'ling.*

How deep do you think the ocean is? You? and you? etc. The highest trees (those in California) and church steeples in this country are about 300 feet high. How many of these, one on top of another, would reach from the bottom of the ocean to the top or surface? Forty.

VII. A RAIN-DREAM.

WHO is not awed that listens[1] to the rain,
Sending his voice before him? Mighty Rain!
The upland steeps are shrouded by thy mists;
Thy shadow fills the hollow vale; the pools
No longer glimmer, and the silvery streams
Darken to veins[2] of lead at thy approach.

O mighty Rain! already thou art here;
And every roof is beaten by thy streams,
And, as thou passest, every glassy spring
Grows rough, and every leaf in all the woods
Is struck, and quivers.

All the hill-tops slake
Their thirst from thee; a thousand languishing fields,
A thousand fainting gardens, are refreshed;
A thousand idle rivulets start to speed.

Thou fill'st the circle of the atmosphere
Alone; there is no living thing abroad,
No bird to wing the air nor beast to walk
The field; the squirrel in the forest seeks
His hollow tree; the marmot of the field
Has scampered to his den; the butterfly
Hides under her broad leaf; the insect crowds,
That made the sunshine populous, lie close
In their sump'-tu-ous shelters, whence the sun
Will summon them again.

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[1] **Listens,** *lĭs'ns.* [2] **Veins,** *vānes.*

I shut my eyes, and see, as in a dream,
The friendly clouds drop down spring violets
And summer col'umbines, and all the flowers
That tuft the woodland floor, or overarch
The streamlet:—spiky[1] grass for genial June,
Brown harvests for the waiting husbandman,
And for the woods a deluge[2] of fresh leaves.

I see these myr'iad drops that slake the dust,
Gathered in glorious streams * * * *
* * * * * * I behold them change
To threads of crystal as they sink in earth
And leave its stains behind to rise again
In pleasant nooks of verd'ure, where the child,
Thirsty with play, with both his little hands
Shall take the cool, clear water, raising it
To wet his pretty lips.

To-morrow noon
How proudly will the water-lily ride
The brimming pool, o'erlooking, like a queen,
Her circle of broad leaves!

All through the starless hours, the mighty rain
Smites with perpetual sound the forest-leaves;
And beats the matted grass, and still the earth
Drinks the unstinted bounty of the clouds—
Drinks for her cottage wells, her woodland brooks—
Drinks for the springing trout, the toiling bee,
And brooding bird—drinks for the tender flowers,
Tall oaks, and all the herbage of her hills.

WILLIAM CULLEN BRYANT.

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[1] **Spiky**, *spīke'e*.

[2] **Deluge**, *dĕl'ūge*, not *ooge*.

VIII. THREE FISHERS WENT SAILING.

HREE fishers went sailing out into the West,
Out into the West as the sun went down;
Each thought on the woman who loved him best,
And the children stood watching them out of the town:
For men must work, and women must weep,
And there's little to earn, and many to keep,
Though the harbor-bar be moaning.

Three wives sat up in the light-house tower,
And they trimmed the lamps as the sun went down;
They looked at the squall, and they looked at the shower,
And the night-rack came rolling up ragged and brown;
But men must work, and women must weep,
Though storms be sudden, and waters deep,
And the harbor-bar be moaning.

Three corpses lie out in the shining sands,
In the morning gleam, as the tide went down,
And the women were weeping and wringing their hands,
For those who will never come home to the town.
For men must work, and women must weep,
And the sooner it's over, the sooner to sleep,
And good-bye to the bar and its moaning.

KINGSLEY.

CHARLES KINGSLEY, an English Clergyman and Author, born in 1819.

IX. COD-FISHING.

Fishing on the Banks of Newfoundland.

ACCUSTOMED from childhood to brave the hardships of a most rig′orous climate, in navigating their frail schooners[1] amid tempest, ice and fog, the inhabitants of New′foundland have developed into one of the finest seafaring populations on the face of the globe. Nowhere can better mariners be found.

2. The principal industry of Newfoundland is the cod-fishery, and the chief center of the trade

[1] **Schooners,** *skoon′ers,* vessels usually carrying two masts.

is at St. John's, its capital, where the process of packing and shipping the salted fish may be witnessed to perfection. The fish, having been dried on stages or platforms erected for the purpose on the shores of every bay and inlet of the island, are brought to St. John's in small schooners and thrown in heaps upon the wharves.[1] There they are culled[2] and sorted into piles according to their quality.

3. Women with hand-barrows attend upon the cullers, carry the fish into an adjoining shed, and upset their loads beside barrels standing ready to receive them. A couple of boys throw the fish into a cask, piling them up a foot or so above the brim, mount on the top, and having danced a war-dance upon them in their hob-nailed boots to pack them down, roll the barrel under a screw-press, where men stand ready to take charge of it.

4. The cask is then rolled out from under the press, and handed over to two coopers. In a trice[3] the hoops are driven on, the cask is headed up, and then trundled[4] down an incline[5] into the hold[6] of some vessel, loading for the West Indies or some Mediterranean port.

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[1] **Wharves,** *hwôrvs,* places for loading and emptying vessels.
[2] **Culled,** *kŭld,* selected or chosen. [3] **Trice,** *trise,* moment.
[4] **Trundled,** *trŭn'dld,* rolled. [5] **Incline′,** a slope.
[6] **Hold,** interior of a vessel, in which its cargo is stowed.

X. CATCHING SEALS.

SEALING operations are vig'orously conducted by the inhabitants of St. John's. In former days the seal fishery was carried on in sailing vessels, and was attended with considerable[1] danger; but now that steamships are used the risk is much diminished. The paying nature of the business[2] may be gathered from the fact that steamers make a large profit, although the sealing season lasts only a month or six weeks.

2. Early in the spring, the ice from the north strikes in towards the eastern coast of Newfoundland, bringing with it hundreds and hundreds of thousands of seals, young and old. Then St. John's wakes up, and the whole island is in a bustle.[3] Though it entails constant exposure to great cold, and extremely hard work, the young men struggle eagerly to secure a berth for the sealing season, for they earn very high wages, enjoy the sport, and the business involves uncertainty and danger which add such a rel'ish to their lives.

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[1] **Considerable**, *con-sid'er-a-ble*, not *sid'ra*. **Business**, *biz'ness*.
[3] **Bustle**, *bus'l*, not *bus'tel*, confusion.

3. At length everything is ready, and a fleet of steamers and of sailing craft of all kinds and sizes, from large coasting schooners down to open boats, issuing from every bay, start out to look for the ice. The ships, crowded with as many men as they can hold, make two trips of about a fortnight's duration each; the first being devoted to the capture of the young seals, at that time only a few weeks old, and the second to the destruction of the full-grown animals. The latter are generally shot, while the former are knocked on the head with clubs.

4. As soon as the ice is reached, the men scatter themselves about the field, running over the rough surface, jumping from block to block of loose ice, tumbling into holes and scrambling out again, wild with excitement in their search for seals.

5. Each man acts independently, doing the best he can for himself. When he has killed a seal he stops but a minute[1] to whip off the skin with the blubber[2] attached, and fasten a cord to it, and then he starts off again after another seal, and so on till he has secured as many as he can drag: then he returns, towing his load behind him, to the ship.

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[1] **Minute,** *min'it.*

[2] **Blubber,** fat of sea animals from which oil is made.

6. These seals are valuable only for the oil which is tried out of their fat, and which is employed for various lubricating[1] purposes, and for their skins, which are tanned and used principally for shoe leather. They do not produce the pelt which, when plucked and dyed, is worked up into those lovely sealskin sacques[2] which ladies so much delight to wear in cold weather.

7. The number of seals brought in annually is very great, as many as five hundred thousand having been killed in a single season. The business employs nearly ten thousand men.

8. The ice, on which they come down in swarms every year from the north, melts during the summer months soon after coming in contact with the warm waters of the Gulf Stream.

9. What then becomes of the seals? Do they find their way back through thousands of watery miles to their polar birthplace, or do they remain scattered about along the shores of Newfoundland and the neighboring continent? It is a problem in natural history.

EARL OF DUNRAVEN.

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[1] **Lubricating,** *lū'bri-kā-ting*, making smooth.

[2] **Sacques,** *sax.*

Do all seals yield fine fur? (*See pages* 29, 30, 31.) Where are the best fur seals captured? Through what preparation does their fur go before it is ready for use? Is the seal a fish? Is the whale a fish? Is their blood cold, or warm? Do they breathe by means of gills, or lungs.

XI. A SHIP IN A STORM.

THE calm[1] which began about four o'clock yesterday afternoon, continued till about nine in the evening. The captain predicted[2] that we should encounter a "gale"[3] from the south-east.

2. The gale came on at about eleven o'clock; not violent at first, but increasing every moment. I slept soundly until after five in the morning, and then awoke with a confused recollection of a good deal of rolling and thumping through the night, which was occasioned by the dashing of the waves against the ship.

3. It was still quite dark. Four of the sails were already in ribbons; the winds whistling through the cordage;[4] the rain dashing furiously and in torrents; the noise and spray scarcely less than I found them under the great sheet at Niagara.

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[1] **Calm,** *käm.* [2] **Predicted,** *pre-dict'ed,* foretold.

[3] **Gale,** *gāle,* wind which blows at the rate of 50 to 60 miles an hour. [4] **Cordage,** *cord'age,* ropes.

4. And in the midst of all this, the captain with his speaking trumpet, the officers and the sailors screaming to each other in efforts to be heard—this, all this, in the darkness which precedes the dawning of day, and with the fury of the hurricane, combined to form as much of the terribly sublime as I ever wish to witness concentrated in one scene.

5. The passengers, though silent, were filled with apprehension. What the extent of the danger, and how all this would terminate, were questions which rose in my own mind, although I was unconscious of fear or trep-ida'tion. But to such questions there are no answers, for this knowledge resides only with Him who "guides the storm and directs the whirlwind."

6. We had encountered, however, as yet, only the commencement of a gale, whose terrors had been heightened by its suddenness, by the darkness, and by the confusion.

7. It continued to blow furiously for twenty-four hours; so that during the whole day I enjoyed a view which, apart from its dangers, would be worth a voyage across the Atlantic.

8. The ship was driven madly through the raging waters, and when it was impossible to walk the decks without imminent risk of being lifted up and carried away by the winds, the poor sailors were kept aloft, tossing and swinging about the yards and in the tops, clinging by their bodies, feet, and arms with mysterious tenacity to the spars, while their hands were employed in taking in and securing sail.

9. On deck the officers and men made themselves safe by ropes; but how the gallant fellows aloft kept from being blown out of the rigging, was equally a matter of wonder aud admiration.

10. However, about seven o'clock they had taken in what canvas had not been blown away. At nine o'clock the hurricane had acquired its full force. There was no more work to be done.

11. The ship lay to, and those who had her in charge only remained on deck to be prepared for whatever disaster might occur. The breakfast hour came and passed, unheeded, though I found my appetite quite equal to the spare allowance of a fast day.

12. By this time the sea was rolling up its hurricane waves; and that I might not lose the grandeur of such a view, I fortified myself against the rain and spray, and in spite of the fierceness of the gale, planted myself in a position favorable for a survey of all around me, and in safety, so long as the ship's strong works might hold together.

13. Our ship rode out the whirlwind without damage and in triumph. True it is, she was made to whistle through her cordage, to creak and moan through all her timbers, even to her masts. True it is, she was made to plunge and rear, to tremble and reel and stagger. Still, she continued to scale the watery mountain, and ride on its very summit, until, as it rolled onward from beneath her, she descended gently on her pathway, ready to triumph again and again over each succeeding wave.

14. At such a moment it was a matter of profound deliberation which most to admire, the majesty of God in the winds and waves or His goodness and wisdom in enabling His creatures to contend with and overcome the elements even in the fierceness of their anger! To cast one's eye abroad on the scene that surrounded me at this moment, and to think man should have said to himself, "I will build myself an ark in the midst of you, and ye shall not prevent my passage; nay, ye indomitable waves shall bear me up, and ye winds shall waft me onward!" And yet there we were in the fullness of this fearful experiment. ARCHBISHOP HUGHES.

ARCHBISHOP HUGHES of New York, was a celebrated and learned prelate of the Catholic Church, born in Ireland, in 1797. At the age of 20 years, he came to the United States, and was educated in Maryland.

SNOW-FLAKES.

WHENEVER a snow-flake leaves the sky,
It turns and turns to say "Good-bye!
Good-bye, dear cloud, so cool and gray!"
Then lightly travels on its way.

And when a snow-flake finds a tree,
"Good-day!" it says—"Good-day to thee!
Thou art so bare and lonely, dear,
I'll rest and call my comrades here."

But when a snow-flake, brave and meek,
Lights on a rosy maiden's cheek,
It starts—"How warm and soft the day!
'Tis summer!"—and it melts away.

XII. THE VOICE OF THE WIND.

LET us throw more logs on the fire!
We have need of a cheerful light,
And close round the hearth to gather,
For the wind has risen to-night.
With the mournful sound of its wailing
It has checked the children's glee,
And it calls with a louder clam'or
Than the clamor of the sea.
Hark to the voice of the wind!

Let us listen to what it is saying,
Let us hearken to where it has been;
For it tells, in its terrible crying,
The fearful sights it has seen.
It clatters loud at the casements,
Round the house it hurries on,
And shrieks with redoubled fury,
When we say, "The blast is gone!"
Hark to the voice of the wind!

It has been on the field of battle,
Where the dying and wounded lie,
And it brings the last groan they uttered.
And the ravenous vulture's cry.
It has been where the icebergs were meeting
And closed with a fearful crash;
On the shore where no footstep has wandered.
It has heard the waters dash.
Hark to the voice of the wind!

It has been on the desolate ocean,
When the lightning struck the mast;
It has heard the cry of the drowning,
Who sank as it hurried past;
The words of despair and anguish,
That were heard by no human ear,
The gun that no signal answered;
It brings them all to us here.
Hark to the voice of the wind!

It has swept through the gloomy forest,
Where the sledge was urged to its speed,
Where the howling wolves were rushing
On the track of the panting steed.
Where the pool was black and lonely,
It caught up a splash and a cry—
Only the bleak sky heard it,
And the wind as it hurried by.
Hark to the voice of the wind!

Then throw more logs on the fire,
Since the air is bleak and cold,
And the children are drawing nigher,
For the tales that the wind has told.
So closer and closer gather
Round the red and crackling light;
And rejoice (while the wind is blowing)
We are safe and warm to-night!
Hark to the voice of the wind!

MISS PROCTER.

ADELAIDE ANNE PROCTER, a poetess, born in London, in 1825.

XIII. THE MISSING SHIP.

IT was long before the cable stretched across the ocean, when the steamers did not make such rapid runs from continent to continent, that the ship *Atlantic* was missing. She had been due in New York for some days, and the people began to despair. "The *Atlantic* has not been heard from yet!" "What news from the *Atlantic* on Exchange?" "None."

2. Telegraph despatches came in from all quarters. "Any news from the *Atlantic?*" And the word thrilled along the wires to the hearts of those who had friends on board. "No."

3. Day after day passed, and people began to be excited when the booming of the guns told that a ship was coming up the Narrows. People went out upon the Battery and Castle Garden with their spy-glasses; but it was a British ship, the Union Jack was flying; they watched her come to her moorings and their hearts sank within them.

4. "Any news from the *Atlantic?*"

5. "Has not the *Atlantic* arrived?"

6. "No!"

7. "She sailed fifteen days before we did, and we have heard nothing from her;" and the people said, "There is no use hoping against hope; she has gone, like the *President*. She has made her last port."

8. Day after day passed, and men looked at one another and said, "Ah, it is a sad thing about the *Atlantic!*"

XIV. BELL OF THE "ATLANTIC."

OLL, toll, toll!
Thou bell by billows swung,
And, night and day, thy warning words
Repeat with mournful tongue!
Toll for the queenly boat,
Wrecked on yon rocky shore!
Sea-weed is in her palace halls—
She rides the surge no more.

Toll for the master bold,
The high-souled and the brave,
Who ruled her like a thing of life
Amid the crested wave!
Toll for the hardy crew,
Sons of the storm and blast,
Who long the tyrant ocean dared;
But it vanquished them at last.

Toll for the man of God,
Whose hallowed voice of prayer
Rose calm above the stifled groan
Of that intense despair!
How precious were those tones,
On that sad verge of life,
Amid the fierce and freezing storm,
And the mountain billows' strife!

Toll for the lover, lost
To the summoned bridal train;
Bright glows a picture on his breast,
Beneath th' unfathomed main.
One from her casement gazeth
Long o'er the misty sea:
He cometh not, pale maiden—
His heart is cold to thee!

Toll for the absent sire,
Who to his home drew near,
To bless a glad, expecting group—
Fond wife and children dear!
They heap the blazing hearth,
The festal board is spread,
But a fearful guest is at the gate;—
Room for the sheeted dead!

Toll for the loved and fair,
The whelmed beneath the tide—
The broken harps around whose strings
The dull sea-monsters glide!
Mother and nursling sweet,
Reft from the household throng;
There's bitter weeping in the nest
Where breathed their soul of song.

Toll for the hearts that bleed
'Neath misery's furrowing trace;
Toll for the hapless orphan left,
The last of all his race!

Yea, with thy heaviest knell,
From surge to rocky shore,
Toll for the living—not the dead,
Whose mortal woes are o'er.

Toll, toll, toll!
O'er breeze and billow free;
And with thy startling lore instruct
Each rover of the sea.
Tell how o'er proudest joys
May swift destruction sweep,
And bid him build his hopes on high—
Lone teacher of the deep!

MRS. SIG'OURNEY.

XV. ALL'S WELL.

DESERTED by the waning moon,
When skies proclaim night's cheerless noon,
On tower, or fort, or tented ground
The sentry walks his lonely round;
And should a footstep haply stray
Where caution marks the guarded way,
Who goes there? Stranger quickly tell;
A friend,—the word. Good-night; all's well.

Or sailing on the midnight deep,
When weary messmates soundly sleep,
The careful watch patrols the deck,
To guard the ship from foes or wreck;
And while his thoughts oft homeward veer,
Some friendly voice salutes his ear,—
What cheer? brother, quickly tell;
Above,—below. Good-night; all's well.

XVI. THE BRAVE PILOT.

JOHN MAYNARD was well known in the lake district as a God-fearing, honest, and intelligent man. He was pilot on a steamboat going from Detroit to Buffalo.

2. One summer afternoon—at that time those steamers seldom carried life-boats—smoke was seen ascending from below, and the captain called out, "Simpson, go below and see what the matter is down there."

3. Simpson came up with his face pale as ashes, and said, "Captain, the ship is on fire."

4. Then "Fire! fire! fire!" on shipboard.

5. All hands were called up, buckets of water were dashed on the fire, but in vain. There were large quantities of rosin and tar on board, and it was found useless to attempt to save the ship.

6. The passengers rushed forward and inquired of the pilot, "How far are we from Buffalo?"

7. "Seven miles."

8. "How long before we can reach there?"

9. "Three-quarters of an hour, at our present rate of steam."

10. "Is there any danger?"

11. "Danger! Here, see the smoke bursting out,—go forward if you would save your lives."

12. Passengers and crew—men, women, and children—crowded the forward part of the ship. John Maynard stood at the helm. The flames burst forth in a sheet of fire; clouds of smoke arose.

13. The captain cried out through his trumpet, "John Maynard!"

14. "Ay, ay, sir!"

15. "Are you at the helm!"

16. "Ay, ay, sir!"

17. "How does she head?"

18. "Southeast by east, sir."

19. "Head her southeast, and run her on shore," said the captain.

20. Nearer, nearer, yet nearer, she approached the shore.

21. Again the captain cried out, "John Maynard!"

22. The response came feebly this time, "Ay, ay, sir!"

23. "Can you hold on five minutes longer, John?" he said.

24. "By God's help, I will."

25. The old man's hair was scorched from the scalp, one hand disabled;—his knee upon the stanchion, and his teeth set, with his other hand upon the wheel, he stood firm as a rock.

26. He beached the ship; every man, woman, and child was saved, as John Maynard dropped, and his spirit took its flight to God.

JOHN B. GOUGH.

XVII. LITTLE MABEL.

MABEL, little Mabel,
With face against the pane,
Looks out across the night
And sees the Beacon Light
A-trembling in the rain.

She hears the sea-birds screech,
And the breakers on the beach
Making moan, making moan.

And the wind about the eaves
Of the cottage sobs and grieves;
And the willow-tree is blown
To and fro, to and fro
Till it seems like some old crone
Standing out there all alone,
With her woe!
Wringing, as she stands,
Her gaunt and palsied hands,
While Mabel, timid Mabel,
With face against the pane,
Looks out across the night,
And sees the Beacon Light,
A-trembling in the rain.

Set the table, maiden Mabel,
And make the cabin warm;
Your little fisher-lover
Is out there in the storm,

And your father—you are weeping!
O Mabel, timid Mabel,
Go, spread the supper-table,
And set the tea a-steeping.

Your lover's heart is brave,
His boat is staunch and tight;
And your father knows the perilous reef
That makes the water white.
—But Mabel, Mabel darling,
With face against the pane,
Looks out across the night
At the Beacon in the rain.

The heavens are veined with fire!
And the thunder, how it rolls!
In the lullings of the storm
The solemn church-bell tolls.

* * * * * *

A boom!—the Lighthouse gun!
(How its echo rolls and rolls!)
'Tis to warn the home-bound ships
Off the shoals!
See! a rocket cleaves the sky
From the Fort,—a shaft of light!
See! it fades, and, fading, leaves
Golden furrows on the night!

What made Mabel's cheek so pale?
What made Mabel's lips so white?
Did she see the helpless sail
That, tossing here and there,
Like a feather in the air,

Went down and out of sight?
Down, down, and out of sight!
O, watch no more, no more,
With face against the pane;
You cannot see the men that drown
By the Beacon in the rain!

* * * * * *

Four ancient fishermen,
In the pleasant autumn air,
Come toiling up the sands,
With something in their hands,—
Two bodies stark and white,
Ah, so ghastly in the light,
With sea-weed in their hair!

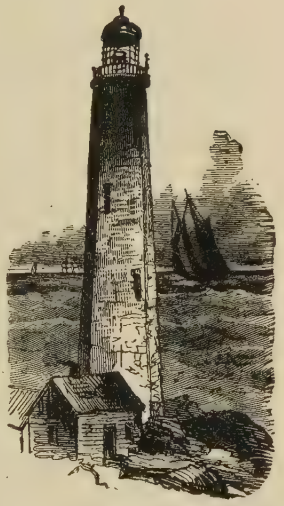
O ancient fishermen,
Go up to yonder cot!
You'll find a little child,
With face against the pane,
Who looks toward the beach,
And, looking, sees it not.

She will never watch again!
Never watch and weep at night!
For those pretty, saintly eyes
Look beyond the stormy skies,
And they see the Beacon Light.

ALDRICH.

THOMAS BAILEY ALDRICH, an American poet, born in New Hampshire in 1836. His writings—prose as well as poetry—have attracted wide attention, and his "Story of a Bad Boy," first printed in "Our Young Folks," has been read with enthusiasm by both old and young.

XVIII. LIGHT-HOUSES.



A Light-house.

1. Light-houses are very necessary in saving ships. When the wind is blowing a ship towards the shore on a dark night, if there were no light-houses the ship would inevitably be destroyed.

2. The **United States** has many miles of sea-coast along the **Atlantic** and **Pacific** Oceans, as well as on the **Gulf of Mexico**, and also in the **great lakes** of the north; these lakes are like seas of fresh water.

3. To protect the shipping on all this long line of coast this country supported in 1873 six hundred and twenty light-houses.

4. Light-houses are built of stone, brick, or iron. To look at some of the rocks before a light-house is built on them, you would say that it was impossible to build anything on such a slippery, wave-washed place as that, for sometimes the rock can be seen for a short time only at low tide.

5. The ingenuity and patient thought of man can, however, overcome many difficulties, and one plan after another has been tried, until all obstacles have been overcome.

6. The next time it blows hard on a dark night, especially if the wind blow towards the shore, you can readily imagine every one on board a ship peering eagerly to see the wished-for light. When at length they see it, what joy spreads from stem to stern! The captain takes out his watch, and, after observing a little, says: "It is a revolving light, and it revolves in so many minutes; now I know which light it is, and I know just where we are."

XIX. THE LIGHT-HOUSE.

THE mariner remembers when a child,
On his first voyage, he saw it fade and sink;
And when returning from adventures wild
He saw it rise again o'er ocean's brink.

Steadfast, serene, immovable, the same
Year after year, through all the silent night,
Burns on forevermore that quenchless flame,
Shines on that inextin'guishable light!

"Sail on!" it says, "sail on, ye stately ships!
And with your floating bridge the ocean span;
Be mine to guard this light from all eclipse,
Be yours to bring man nearer unto man!"

LONGFELLOW.

XX. THE STORY OF EDDYSTONE.

Eddystone Lighthouse.

THE first lighthouse of a regular character on the shores of England was erected about 1699, of stone and timber. The *Eddystone* is the name of the highest summit of a reef of rocks

lying in deep-water about fourteen miles to the south-west of Plymouth[1] harbor.

2. At high water they are barely visible, and their position could only be told by the waves which *eddy*[2] and seethe above them; at low water several low, broken, and dismal-looking ridges are seen. When the wind blows no ship involved in the vortex[3] could hope to escape destruction.

3. It may readily be seen that so perilous a reef, when unprotected by any beacon,[4] was a source of deep alarm to the mariner. Wrecks were so numerous that the erection of a lighthouse was a matter of national concern; yet no one could be found to undertake a task whose accomplishment nature seemed to have rendered impossible, until Henry Winstan'ley, a country gentleman of Essex, chivalrously came forward, and having obtained the necessary legal powers, proceeded to carry his design into execution.

4. The first summer—and it was only in summer the work could be carried on—was occupied in making twelve holes in the rock, and fastening as many irons[5] in them. The task pro-gress'ed but slowly, for, as Winstanley himself relates, though it was summer, the weather would at times prove of such terrible violence, that for ten days together the sea would so rage about the rocks as to bury the works, and prevent all approach to them.

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[1] **Plymouth**, *plim'uth.*

[2] **Ed'dy**, con'trary current, a whirlpool.

[3] **Vor'tex**, center of whirlpool

[4] **Beacon**, *be'kn*, a signal.

[5] **Irons**, *i'urnz*

5. The second summer was spent in constructing a solid, round pillar, and in the third year all was finished; the lantern was placed and they ventured to lodge there soon after mid-summer.

6. Winstanley was proud of his work, and so convinced, it is said, of its entire solidity, that he expressed a wish to be beneath its roof in the greatest storm that ever blew under the face of heaven, convinced that it could not shake one joist or beam.

7. He had his wish fulfilled. With his workmen and keepers he had taken up his abode in the light-house, when a terrible gale blew, and on the 26th of November, attained to an unparalleled excess of fury.

8. All through that memorable night the tempest raged. As soon as morning came the people of Plymouth hastened to the beach, and looked toward the Eddystone. But no structure crowned the rock over which the waves were tossing all unchecked. The light-house was swept away, and no vestige[1] remained of its adventurous occupants.

9. The light-house which was afterward built was commenced by John Smeaton, and finished in 1759. This becoming unsafe a new one, built of granite, was completed in 1881. The violence of the swell, even in mild weather, renders communication with the shore exceedingly dangerous; and the sea frequently rises above the light.

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[1] Ves'tige, trace.

Blackboard Drawing of the Gulf Stream (warm) and Arctic Current (cold). Draw a frame 24 inches from north to south, and 26 inches from east to west. On it mark points where the outlines of the continents touch it, making every line and distance exactly eight times as long as in the diagram. The arrows show the directions in which the currents flow. The current in dotted lines is cold.

XXI. OCEAN CURRENTS—GULF STREAM.

1. The waters of the oceans are in constant motion, those of warm parts of the earth flowing toward the cold regions, and those from the cold parts flowing toward the hot regions.

2. The coldest parts of the earth are the most

northern and southern [the teacher pointing to them on a globe or map], and the hottest parts are midway between them, or on each side of a great circle called the Equator.

3. In the oceans are great streams or currents which flow like rivers. The warm stream is called the Equatorial Current, and the cold streams are called Arctic and Antarctic Currents.

4. One of the principal branches of the Equatorial Current is called the Gulf Stream, which, as you may see in the drawing, issues from the **Gulf of Mexico.**

5. Of course it is only that part of the great Equatorial Current which is turned northwest by the eastern part or elbow of **South America,** entering the Gulf of Mexico between **Cuba** and **Yucatan,** and leaving it between **Cuba** and **Florida.**

6. This Gulf Stream, flowing in a northeast direction across the Atlantic, is, therefore, a stream of warm water rushing through and over the cold waters of that part of the ocean.

7. The Gulf Stream and winds from the southwest carry heat all the way to the west coast of Europe, keeping the fields of **England** and **Ireland** fresh and green even in winter, and protecting those countries from a climate similar to that of **Labrador,** where for five or six months in the year the waters are frozen and the ground is all covered over

with snow. Observe that Labrador is no further from the Equator than are those countries.

8. The waters of the Gulf Stream moderate the winters also of **Norway** and **Iceland.**

9. You can readily see that a ship can sail from the **United States** to **Europe** with the Gulf Stream in a shorter time than it can from Europe to this country, against the stream.

10. The chief causes of these ocean currents are the heat of the sun and the revolution of the earth on its axis. The winds also have an effect on them.

11. There are other currents in the ocean; one in the North Pacific is similar to the Gulf Stream of the Atlantic. It carries warmth and fertility to the shores of **California, Oregon,** and **Washington.**

What advantage is there in these movements of the waters of the ocean? *They lessen the heat of the hottest parts of the earth and the cold of the coldest parts.*

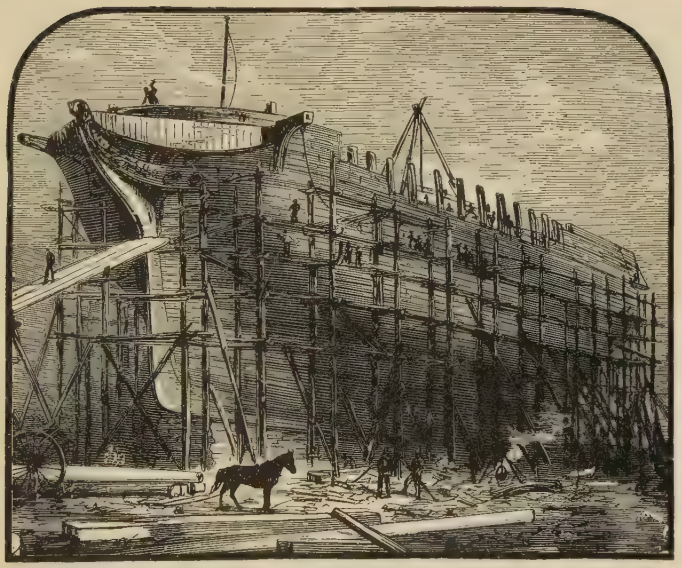
Of what benefit is the Gulf Stream to the countries of Western Europe? *It tempers their winters, and its vapors supply their rains.*

How are its vapors conveyed to those countries? *By the westerly winds.*

What supplies the rains of California, Oregon, Washington, and Alaska? *Vapors from the Pacific Ocean.*

Where do these warm streams come from? *From the hottest or Equatorial parts of the earth's surface.*

Where do the cold streams come from? *From the coldest or Polar Regions.*



Building a Ship.

XXII. SHIPS, DOCKS, ETC.

ON the sea-coast or on the bank of a river you will sometimes find a ship-yard where ships are built.

2. To build a ship, men lay a great, long timber called the keel, on an inclined track or platform. To this keel are fastened the ribs, or curved timbers, which form the sides of the ship. The whole is supported and surrounded by a great frame called the stocks.

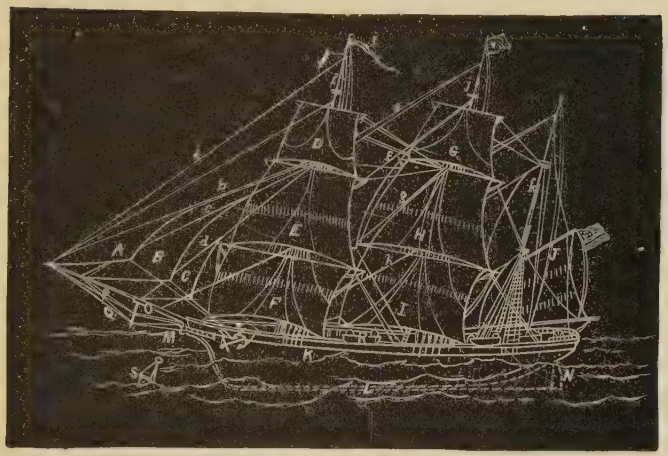
3. The ribs are then covered with thick planks, and those planks which are below the water-line are covered with plates or sheets of copper or other metal.

4. Steamships are now built wholly of iron and steel. The plates, instead of planks, are secured by bolts and rivets passing through their overlapping edges. Iron ships can carry larger cargoes than wooden ships.

5. When the body or hull of the ship is ready to be launched, long, slanting timbers are placed under it, reaching down into the water. These timbers or tracks are covered with grease and soap, some of the props removed, and the whole is made to slide down into the water. People take great pleasure in witnessing a launch.

6. After the ship is launched it receives its masts and sails, and is finished. If intended for a steamship, it is also provided with engines, furnaces, smoke-pipes, and perhaps paddle-wheels.

7. Instead of paddle-wheels, which you may see at the sides of steamboats, you will find that now most steamships are driven by a propeller, or huge iron screw, at its stern, or hinder part. When this propeller turns round and round very rapidly, its great, wide arms strike the water in such a way as to push the steamer ahead at the rate of about fifteen knots or miles, every hour.



Blackboard Drawing. Names of sails, etc.; A, flying-gib; B, jib; C, foretop-mast-stay sail; D, foretop-gallant sail; E, foretop sail; F, fore-course; G, maintop-gallant sail; H, maintop sail; I, main-course; J, mizzen-spanker.

K, hull or body; L, keel; M, bow; N, rudder; O, bowsprit; P, jib-boom; Q, martingale; R, life-boat; S, buoy.

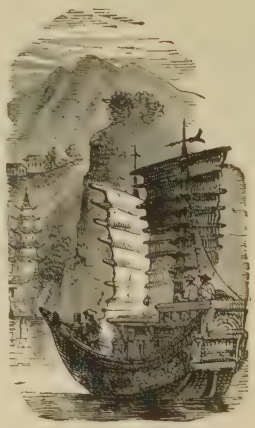
a, Foreroyal stay; c, foretop-gallant stay; d, foretop-mast stay; e, maintop-gallant stay; f, maintop-mast stay; h, main stay; i, foretop-gallant mast; j, maintop-gallant mast; k, mizzen-top mast.

8. Here is a ship (pointing to one on the chart). See with what ease she moves upon her way, her swelling sails urging her onward with the favoring breeze. What wonderful progress men have made from the time when the rude savage straddled his log and floated first along the shore!

9. Almost as primitive is the large earthen jar used by the fisherman at the mouth of the **Ganges River.** He

fishes as he floats, and puts the fish into the jar that is at once his support and his storehouse. Other races use rafts, bark canoes, hollow logs called dug-outs, and boats of basket-work covered with skins.

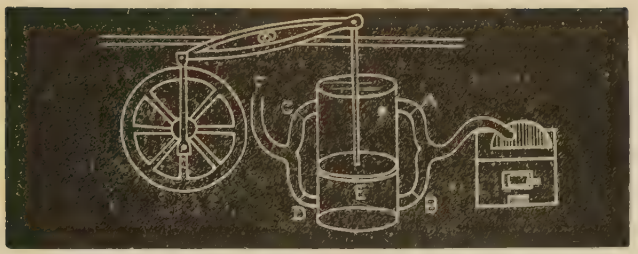
10. Then came the idea of a mast with a sail of skin or matting. As soon as men learned how to make planks they used them to make boats. These increased in size, as did their sails, until large enough to be called sloops or schooners or ships, which can carry hundreds of men and thousands of tons of merchandise for thousands of miles across a trackless ocean.



A Chinese Junk.

11. The immense quantities of cotton, corn, wheat, butter, cheese, petroleum, beef, pork, and other articles which are being shipped to Europe every year bring great wealth to this country.

12. When men discovered the power of steam, they made steamboats and steamships. These move over the water by means of the power of the vapor of water, that we call steam.



Blackboard Drawing. On the right is a furnace, on which is the boiler, partly filled with water. Steam collects in the curved top of the boiler, and is let into the cylinder, first at A, then at B, then A, then B, or one after another, so as to push the piston, E, up and down rapidly, thus moving the large working-beam, which sets the whole machinery in motion. C and D are exhaust-pipes.

13. Here is a rough drawing to show how the steam does its work. When the steam comes from boiling water it expands very much, and this expansion is the power we employ.

14. The cylinder is a strong vessel of iron or steel in shape like one joint of a stovepipe, but very much larger. The steam comes out very hot, as well as very powerful and expansive, and getting in under the piston, pushes it up, and, consequently, pushes the piston-rod which is attached to it. This rod sets the machinery in motion, and works the paddle-wheels of the steamboat or the great revolving screw or propeller of the steamship.

15. When the steam has pushed the piston up to the top of the cylinder the steam-pipe inlet is shut off below and let on above. At the

same time the exhaust-pipe outlet is closed above and opened below, so that by opening and shuting these outlets and inlets the piston is kept going up and down with power enough to force a large boat through the water, or a locomotive with many cars behind it along a railroad.

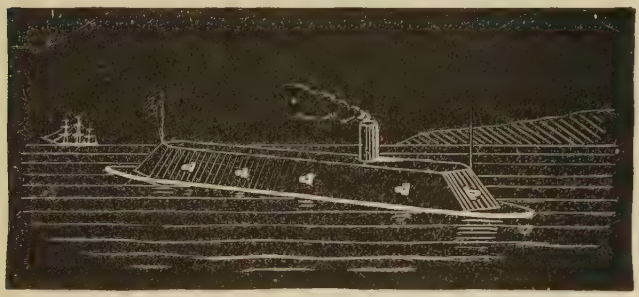
A Steamship and Sailing Vessels on the Ocean.

16. Men have also made steamers whose outside is entirely of iron. One of these, the *Great Eastern*, is like a small village in the number of persons it can carry.

17. War-steamers of iron have been built

with very thick sides so as to resist cannon-balls.

18. The *Devastation*, an English vessel of this class, has on her sides twelve inches of iron, backed by eighteen inches of wood, and the *Dictator*, an American vessel, has six inches of iron, backed by forty-two inches of wood, making a very formidable barrier.



The Ironclad "Merrimac."

19. Two of the most celebrated ironclad vessels of war were the *Merrimac* (or *Virginia*) and the *Monitor*.

20. The former, a Confederate war-vessel, with a sloping roof of railroad iron, attacked and destroyed the Union war-vessels (not ironclad) *Cumberland* and *Congress*, whose heavy cannon-balls glanced harmlessly off. Nothing then seemed easier than to destroy all the other Union vessels it could reach; but the little ironclad *Monitor*, less than one-fifth the weight of the *Merrimac*, arrived from New York just in the nick of time. The two ironclads went at each other, and for several hours they fought furiously. Five times the *Merrimac* tried to run down and sink her brave little antagonist; broadside after broadside was hurled at it, but its hull, its deck, and its

round, revolving turret (small tower) were too strongly covered with plates of iron. The *Merrimac* was compelled to retire from the contest, which was her last.

Battle between the Merrimac and Monitor.

21. The *Monitor's* two big guns were fired through openings in the tower. When fired, the cannons were brought back into the tower and the openings closed by heavy iron doors.

22. This famous engagement took place at the mouth of the **James River,** near the City of **Norfolk,** in 1862.

23. The length of the *Monitor* was 174 feet and its width 41 feet.

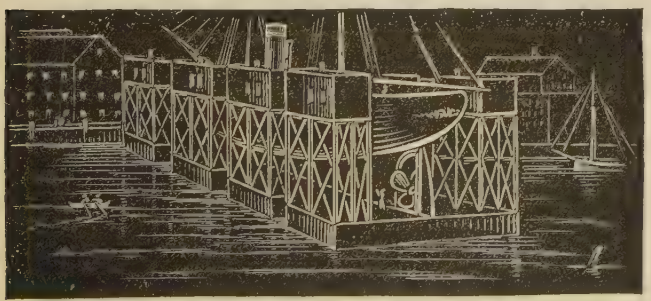
24. A dock is a part of a harbor or river which is enclosed between piers, wharves, or high banks, where vessels may enter to load or unload.

25. Some docks have gates to close tightly where it is necessary to prevent the water from running out with the falling tide.

Blackboard Drawing of a floating Dry-Dock. Water let into dock, which sinks to receive vessel.

26. A dry-dock is one from which the water may be shut out or pumped out.

27. Some dry-docks are floating docks like that shown in the chart and in the blackboard drawing. Such have cisterns or hollow spaces between their sides or under the floor, into which water is admitted until the dock sinks deep enough to admit a vessel needing repairs.



Blackboard Drawing of a floating Dry-Dock. Water pumped out of dock, causing dock to rise, lifting the vessel.

28. When the vessel is properly braced or

propped up, the water is pumped out by steam, and the dock, vessel and all, rise as you see in the drawing.

29. Some docks at low tide are entirely without water. Such are enclosed by strong gates, like those of canals, which keep the water in to float the vessels. These also are dry-docks, although not floating docks.

30. When a vessel needs repairing or cleaning, it sails in with the rising tide, and is then propped up. When the tide falls the gates are opened, and the water passes out; then the gates are closed, and the water is kept out until the vessel is ready to sail. These stationary dry-docks are constructed only in those rivers and bays in which the rise and fall of the tides are sufficient for the purpose.

31. The city of **London,** the largest city in the world, has such docks; its tides rise and fall about eighteen feet. Such, also, are the magnificent docks of the city of **Liverpool,** where the tides rise and fall fifteen feet. Much of that city's importance is due to these docks, in which can be seen at any time steamships and other vessels from almost every country in the world, loading or unloading their cargoes. The **Brooklyn** dry-dock is the finest in the United States.

32. How is a ship steered? *By means of a helm, or rudder.*

When sailors are far out at sea and no land is in sight, what guides have they in ascertaining the directions? *The stars and the mariner's compass.*

XXIII. ABOUT THE ZONES.

ON the map of the world you may see lines crossing from east to west. These lines or circles divide the earth's surface into five great belts or zones, which differ greatly in the amount of their heat and cold.

2. The hot zone is called the Torrid Zone. When you read of any country which is so warm that the people wear the coolest and lightest clothing, and where trees, flowers, and fruits grow all through the year because no frost ever touches them, where beautiful birds and large, savage animals are numerous, where boys and girls never enjoy skating or snowballing, and where the sun is sometimes directly over people's heads, you may know that country is in the Torrid Zone.

3. Countries which have such a hot climate are mostly in Africa, Southern Asia, and South America.

4. In some parts of Africa you might travel many days without seeing rain, or grass, or trees, or anything around you but a hot, sandy desert; while in other parts where there is rain with the intense heat, the dense forests, high grass and warm streams afford shelter to countless wild creatures.

5. In the southern parts of Asia are Arabia and India, where the heat is sometimes fearful, and where lions, tigers, and poisonous serpents are feared by everybody living there.

6. Nearer us, and also in the hot zone, is the northern part of South America, where no one ever sees any snow or feels cold weather, unless he climb far up one of those huge mountains whose tops are always covered with snow; that is the land which is famous for innumerable birds, fishes, and monkeys—the basin of the Amazon.

7. The cold zones—there are two of them—are called the Frigid Zones. They are the parts of the earth furthest from the hot or Torrid Zone. One is north of the Arctic Circle, and the other is south of the Antarctic Circle. There men can hardly endure the cold. They wear thick furs throughout the year.

8. Only in the Temperate Zones do people enjoy the four delightful seasons—spring, when the farmer plows and sows, and when the grass and plants spring up; summer, when trees are covered with leaves, and fields with ripening grain; autumn, when the fruits are gathered and the leaves fall at the approach of frost; and winter, when all nature seems asleep under a beautiful white covering of snow. We live in the North Temperate Zone.

9. You have heard that some countries are very warm at the same time that some other countries are very cold. That is true.

10. If two boys should start from this country in the month of March, one for Greenland and the other for South America, one would find it colder and colder, and the other warmer and warmer, every day.

11. If each should write a letter home from there on New Year's day, one might read like this:

"It is dreadfully cold here. All around, as far as I can see, are ice-fields, icebergs, and snow. Even in summer, it is so cold here that we must wear the warm furs of the seal or bear which men kill here."

12. The other boy would write from Brazil something like this:

"This is New Year's Day, the first of January, and it is so hot that I feel just like staying in the shade all the time fanning myself. I go in swimming every day. There are lots of nice oranges and

bananas on the trees out of doors, and more beautiful birds and funny monkeys in the woods than I can count.

XXIV. JACK FROST.

THE frost looked forth one still, clear night,
And whispered, "Now, I shall be out of sight:
So, through the valley, and over the height,
In silence I'll take my way.
I will not go on like that blustering train—
The wind and the snow, the hail and the rain—
Which make so much bustle and noise in vain;
But I'll be as busy as they."

Then he flew to the mountain and powder'd its crest,
He lit on the trees, and their boughs he drest
In diamond beads.

But he did one thing that was hardly fair;
He peeped in the cupboard, and finding there
That all had forgotten for him to prepare—
"Now, just to set them a thinking,
I'll bite this basket of fruit," said he,
"This costly pitcher I'll burst in three;
And the glass of water they've left for me
Shall 'tchick!' to tell them I'm drinking."

HANNAH T. GOULD

Head of River—Cascade—Mill—Overshot Wheel.

XXV. RIVERS, CASCADES.

1. You would not ride far on a railroad without crossing one, perhaps several, rivers, which are streams of water always flowing toward lower ground. Do you know how they are formed, where they come from, where they go, and what good they do?

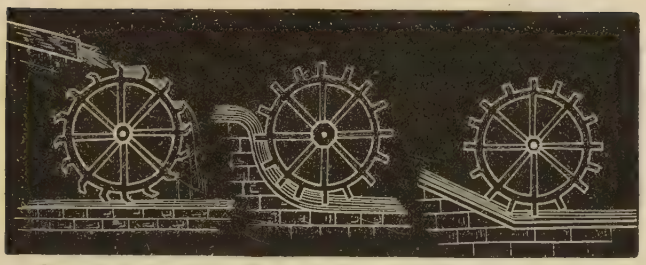
2. Look at the chart and you will see several rivers. Some are formed by rain which sinks into the ground and appears again at openings in lower ground as springs, and others are formed far up the sides of mountains merely by the melting of snow.

3. On the chart you may see a river formed by rain which falls on the hills; and on the left, in front, you may see a river which has its source, or beginning, or head, very far up a mountain, which is so high that its summit or top is always covered with snow.

4. Rivers at first are usually very small; almost any of you could jump or wade across them. In some places they tumble over precipices, where they are called cascades or waterfalls. But as they flow on and down, they are joined by other little streams coming from different directions, and little by little they grow larger and deeper.

5. In some places you would find boys and men having fine sport with their fishing-rods, lines, and hooks catching trout or other fish.

6. As you descend the stream, you may see a mill so built that the rushing water may turn a great wooden wheel. This wheel is made either with broad arms like the paddle-wheels of a steamboat, or with buckets at its outer edge, that the stream may so strike these arms or fill the buckets as to turn it round and round, as shown on the next page.



Overshot-wheel. Breast-wheel. Undershot-wheel.

Make the wheels in the blackboard drawing 12 inches in diameter, and instruct the class that a mill-wheel is about 12 feet in diameter, making the comparison on the wall of the room.

7. How this water-wheel turns other wheels and the stones inside the mill so as to grind wheat into flour, corn into meal, or to saw logs into boards, you will learn in a lesson further on.

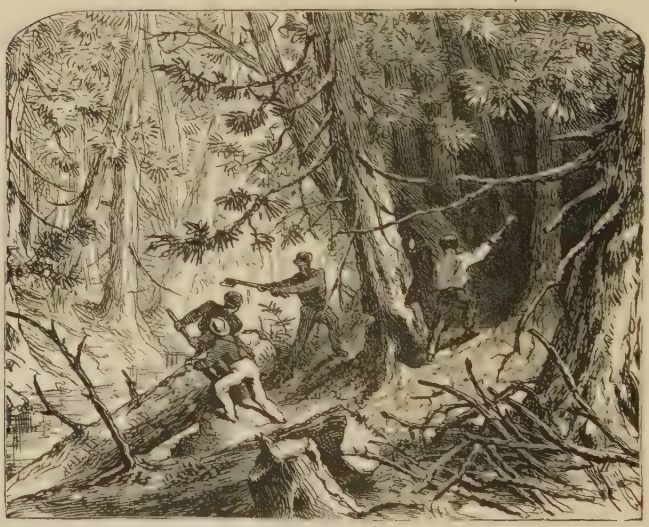
8. As the wheels of all mills are not turned by water in precisely the same way, you may see from the blackboard drawing three different ways of applying the water to the wheels.

9. The water-wheel on the left hand of the chart is called an overshot-wheel, because the water is shot over it.

10. When the water comes just abreast of the axle of the wheel it is called a breast-wheel.

11. One which is turned by a stream running under it is called an undershot-wheel.

12. Such a one is used by the washerwomen in **Paris,** where it is attached to the side of a large, stout boat that is held fast by anchors or cables, and does their work for them.



A Pine Forest—Lumber-men at Work.

13. This stream that runs down hill is also very useful for carrying down logs. In the winter, when the farmers cannot plough or sow or reap, they go into the woods and cut down trees. The branches they cut off and draw home for firewood, but the trunks they cut up into logs of about thirteen feet or more in length, and then roll them to the bank of the stream, or drag them on the snow by means of oxen or horses. You may see some logs in the chart, on the bank of a stream.

14. Immense quantities of lumber are obtained every year from the forests of **Michigan, Wisconsin, Minnesota, California, Oregon, Maine,** and **Canada.**

Logs Floating down a Stream.

15. As soon as the snow is melted and the streams are full, so that they have plenty of water to float them, the wood-choppers roll the logs into the stream, and away they go, helter-skelter, until they are stopped by a "boom" or stout log that is fastened there for that purpose. Then, one by one, they are dragged into the saw-mill, which gets all its power (either steam or water-power) from the same water that brought down the logs.

16. When a log is fixed securely in its place, the big saw begins to saw it up into boards. Sometimes what is called a "gang-saw" is set to work, which cuts up a log at once into good boards or planks.

17. A gang-saw is a frame full of saws set just the width of a board apart. For what are boards and planks used?

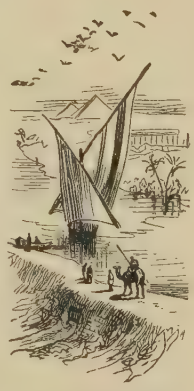
18. Some rivers carry from the lands through which they flow rapidly great quantities of soft earth or mud, called silt, which they deposit at or near their mouths.

19. Noted for this are the **Mississippi, Nile, Ganges, Danube, Po, Rhone,** and **Rhine.**

20. The mud deposited in this way divides the stream at its mouth, giving it several mouths; the land so filled between these mouths is called a delta.

21. The land on which the City of **New Orleans** stands, and for a long distance all around it and down to the Gulf of Mexico, was carried there by the **Mississippi** River and its branches.

22. Look at the **Gulf of Mexico** where the Mississippi flows into it and you will see that a large part of the Gulf has been filled up in this way. The State of **Louisiana** is, therefore, growing larger every year, and the mouth of that great river is getting further and further from the City of New Orleans. A like effect is caused by the River Nile where it flows into the **Mediterranean Sea.**



The River Nile.

23. It is estimated that the Mississippi River carries down every five years an amount of silt sufficient to cover the whole of the State of Rhode Island twelve inches deep.

Lachine Rapids in the River St. Lawrence.

24. After long and heavy rains or the sudden melting of a winter's snow, some rivers become so full that they overflow their banks, and the rush of their water over the low lands causes great destruction to property and loss of life. To prevent this on the lower Mississippi, men have constructed long, high banks, called levees.

25. Sometimes, however, a bank bursts or is washed away, and the overflow does immense damage to crops, houses, cattle, etc.

The overflow of the Ohio River in 1883 caused great damage and suffering to the inhabitants along its banks. Thousands of houses were lifted from their foundations and floated off by the rising waters.

26. Although damage is often done in this

way by inundations, they are not always destructive; indeed, in some places people could not live without them.

27. One of the oldest and most celebrated countries in the world owes its existence to the yearly rise and overflow of a river. That country is **Egypt,** and that river, the **Nile.**

28. Rain is almost unknown in Egypt, and, consequently, without the yearly rise of the Nile, that country would be a desert.

29. The Nile rises so high (30 to 35 feet) that very high banks have been constructed in Egypt.

30. Through gates or openings in these banks and by means of small canals or ditches, the farmers conduct the muddy water of the Nile to their farms and allow it to flow all over their land and cover it with that soft mud which makes the soil very fertile.

31. Dry and barren lands in Utah have been converted into rich and productive farms, orchards and gardens, simply by water conducted from mountain streams.

32. The Nile receives its water from the lakes of Central Africa, which are supplied by annual rains. This river begins to rise in Egypt in the month of **June,** and attains its greatest height in **September.**

The Rhine River, flowing through Germany.

33. Some rivers are, for long distances, confined between high, natural banks or bluffs, like the beautiful **Rhine,** which flows through Germany; others flow between very high mountains, and in deep gorges or ravines, called cañons (*kan'yons*).

34. The Colorado River (*kol-o-rah'do*) is celebrated for its great cañons in **Colorado, Utah,** and **Arizona.** Many other rivers in the Territories of the United States flow through cañons.

35. Where the bed of a river is very rough,

rocky and sloping, the water rushes down violently and rapidly. Such parts of a river are called rapids. (See rapids in the chart.)

The **St. Lawrence River** contains the celebrated Lachine (*lah-sheen'*) Rapids.

36. A lake is a body or collection of water which is formed and fed by one or more rivers; these are called its inlets. The water of most lakes is fresh; some lakes which have no outlets or outflowing streams are salt.

37. The largest fresh water lakes in the world are those between the **United States** and the **Dominion of Canada**; their names are **Superior, Huron, Michigan, Erie,** and **Ontario.** Great Salt Lake is in **Utah.** Observe from the chart that some lakes are on low and others on high ground.

38. Lakes and rivers are very useful in many ways; people sail on them to different parts of their State or Country, and on them they send and receive all sorts of things, such as food, clothing, and building materials, very easily and cheaply. On account of these advantages people have built cities, towns, and villages on or near the banks of rivers and lakes.

39. This buying, selling, and trading between people of different States or Countries is called commerce. Commerce is carried on also by way of railroads and canals and the great ocean or sea. (You will learn about canals in Chapter XXXV.)

The Hudson River as it passes through the Adirondacks.

XXVI. SONG OF THE BROOK.

COME from haunts[1] of coot[2] and hern[3]
I make a sudden sally
And sparkle out among the fern,
To bicker down a valley.

By thirty hills I hurry down,
Or slip between the ridges,
By twenty thorps,[4] a little town,
And half a hundred bridges.

Till last by Philip's farm I flow
To join the brimming river,
For men may come and men may go,
But I go on forever.

I chatter over stony ways,
In little sharps and trebles,
I bubble into eddying bays,
I babble on the pebbles.

With many a curve my banks I fret
By many a field and fallow,
And many a fairy foreland set
With willow-weed and mallow.

I chatter, chatter as I flow
To join the brimming river;
For men may come and men may go,
But I go on forever.

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[1] **Haunt**, *hänt*, a place to which one frequently resorts.
[2] **Coot**, *koot*, a water-fowl. [3] **Hern**, *hurn*, a her'on, a wading bird
[4] **Thorp**, a hamlet or small village.

I wind about, and in and out,
With here a blossom sailing,
And here and there a lusty trout
And here and there a grayling.

And here and there a foamy flake
Upon me, as I travel
With many a silvery waterbreak
Above the golden gravel.

And draw them all along, and flow
To join the brimming river,
For men may come and men may go
But I go on forever.

I steal by lawns and grassy plots,
I slide by hazel covers;
I move the sweet forget-me-nots
That grow for happy lovers.

I slip, I slide, I gloom, I glance,
Among my skimming swallows,
I make the netted sunbeam dance
Against my sandy shallows.

I murmur under moon and stars
In brambly wildernesses;
I linger to my shingly bars;
I loiter round my cresses;

And out again I curve and flow
To join the brimming river,
For men may come and men may go,
But I go on forever.

TENNYSON.

ALFRED TENNYSON, an English poet, born in 1809.

XXVII. BROOK AND WEE ELSIE

A BROOK and wee Elsie
Were playing together,
One frolicsome day
Of the sunshiny weather,
At "tag" and "bo-peep;"
Naughty creatures were they,
For the brook and wee Elsie
Had both run away.

One time, when they paused
In a lovely, cool place,
Elsie saw in the water
Her round dimpled face;

And "How funny!" she said,
With a wondering look,—
"Now, how could my face
Get into the brook?"

A half minute later,
A gypsying bee
Left Elsie in tears,
Sorry object to see.
"Here's another queer problem,"
The little brook cries;
"Now, how did I ever
Get into her eyes?"

CARRIE W. THOMPSON.

A SNOW-FLAKE.

ONCE he sang of summer,
Nothing but the summer;
Now he sings of winter,
Of winter bleak and drear:
Just because there's fallen
A snow-flake on his forehead
He must go and fancy
'T is winter all the year!

T. B. ALDRICH.

XXVIII. THE LUMBERMEN.

WILDLY round our woodland quarters,
Sad-voiced autumn grieves;
Thickly down these swelling waters
Float his fallen leaves.
Through the tall and naked timber,
Column-like and old;
Gleam the sunsets of November,
From their skies of gold.

O'er us, to the southland heading
Screams the gray wild-goose;
On the night-frost sounds the treading
Of the brindled moose.
Noiseless creeping while we're sleeping,
Frost his task-work plies;
Soon his icy bridges heaping,
Shall our log-piles rise.

When, with sounds of smothered thunder,
On some night of rain,
Lake and river break asunder
Winter's weakened chain,
Down the wild March flood shall bear them
To the saw-mill's wheel,
Or where steam, the slave, shall tear them,
With his teeth of steel.

Be it starlight, be it moonlight,
In these vales below,
When the earliest beams of sunlight
Streak the mountain's snow,
Crisps the hoar-frost, keen and early,
To our hurrying feet,
And the forest echoes clearly
All our blows repeat.

Make we here our camp of winter;
And, through sleet and snow,
Pitchy knot and beechen splinter
On our hearth[1] shall glow.
Here, with mirth to lighten duty,
We shall lack alone
Woman's smile and girlhood's beauty,
Childhood's lisping tone.

But their hearth is brighter burning
For our toil to-day;
And the welcome of returning
Shall our loss repay,
When, like seamen from the waters,
From the woods we come,
Greeting sisters, wives, and daughters,
Angels of our home!

WHITTIER.

JOHN GREENLEAF WHITTIER, an American poet, born in Massachusetts in 1807. He is a member of the Society of Friends (Quakers). He worked on the farm till his twentieth year, when he entered the Haverhill Academy. He afterward became editor and poet.

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[1] **Hearth**, *härth*.

XXIX. SCENE AT NIAGARA FALLS.

IT is summer. A party of visitors are just crossing the iron bridge that extends from the American shore to Goat Island, about a quarter of a mile above the falls. Just as they are about to leave, while watching the stream as it plunges and dashes among the rocks below, the eye of one fastens on something clinging to a rock—caught on the very verge of the falls.

2. Scarcely willing to believe his own vision, he directs the attention of his companions.

3. The terrible news spreads like lightning, and in a few minutes the bridge and the surrounding shore are covered with thousands of spectators. "Who is he?" "How did he get there?" are questions every person proposed, but answered by none.

4. No voice is heard above the awful flood, but a spy-glass shows frequent efforts to speak to the gathering multitude. Such silent appeals exceed the eloquence of words; they are irresistible, and something must be done.

5. A small boat is soon upon the bridge, and with a rope attached sets out upon its fearless voyage, but is instantly sunk. Another and another are tried, but they are all swallowed up by the angry waters. A large one might possibly survive; but none is at hand.

These falls, one of the wonders of the world, are in the Niagara River, between New York and Canada. Their height is 160 feet.

6. Away to Buffalo a car is dispatched, and never did the iron-horse thunder along its steel-bound track on such a godlike mission. Soon the most competent life-boat is upon the spot.

7. All eyes are fixed upon the object, as, trembling and tossing amid the boiling white waves, it survives the roughest waters. One breaker past and it will have reached the object of its mission. But being partly filled with water and striking a sunken rock, the next wave sends it hurling to the bottom.

8. An involuntary groan passes through the dense multitude, and hope scarcely nestles in a single bosom. The sun goes down in gloom, and as darkness comes on and the crowd begins to scatter, methinks the angels looking over the battlements on high drop a tear of pity on the scene. The silvery stars shine dimly through their curtain of blue.

9. Long before morning he must be swept over that dreadful abyss; he clings to that rock with all the tenacity of life, and as he surveys the horrors of his position strange visions in the air come looming up before him. He sees his home, his wife and children there; he sees the home of his childhood; he sees that mother as she used to soothe his childish fears upon her breast; he sees a watery grave, and then the vision closes in tears.

10. No sooner does morning dawn than the multitude again rush to the scene of horror. Soon a shout is heard; he is there—he is still alive! Just now a carriage arrives upon the bridge, and a woman leaps from it and rushes to the most favorable point of observation.

11. All eyes are turned for a moment toward the anxious woman, and no sooner is the glass handed to her, fixed upon the object, than she shrieks, "Oh, my husband!" and sinks senseless to the earth.

12. The excitement, before intense, seems now almost unendurable, and something must again be tried. A small raft is constructed, and, to the surprise of all, swings up beside the rock to which the sufferer has clung for the last forty-eight hours. He instantly throws himself full length upon it.

13. Thousands are pulling at the end of the rope, and with skillful management a few rods are gained toward the nearest shore.

14. What tongue can tell, what pencil can paint, the anxiety with which that little bark is watched as, trembling and tossing amid the roughest waters, it nears that rock-bound coast?

15. Save Niagara's eternal roar, all is silent as the grave. His wife sees it and is only restrained by force from rushing into the river. Hope instantly springs into every bosom, but it is only to sink into deeper gloom. The angel of death has spread his wings over that little bark; the poor man's strength is almost gone; each wave lessens his grasp, but all will be safe if that nearest wave is past.

16. But that next surging billow breaks his hold upon the pitching timbers, and hurls him to the awful verge, where, with body erect, hands clenched, and eyes that are taking their last look of earth, he sinks forever from the gaze of man.

CHARLES TARSON.

XXX. THE WATER-MILL.

H! listen to the water-mill, through all the live-long day,
As the clicking of the wheels wears hour by hour away;
How languidly the autumn wind doth stir the withered leaves,
As on the field the reapers sing, while binding up the sheaves!
A solemn prov'erb strikes my mind, and as a spell is cast,—
"The mill will never grind again with water that is past."

Oh! clasp the proverb to thy soul, dear loving heart and true,
For golden years are fleeting by, and youth is passing too;
Ah! learn to make the most of life, nor lose one happy day,
For time will ne'er return sweet joys neglected, thrown away;
Nor leave one tender word unsaid, thy kindness sow broadcast,—
"The mill will never grind again with water that is past."

Oh! the wasted hours of life, that have swiftly drifted by,
Alas! the good we might have done, all gone without a sigh;

Love that we might once have saved by a single kindly word,
Thoughts conceived but ne'er expressed, perishing unpenned, unheard.
Oh! take the lesson to thy soul, forever clasp it fast,
"The mill will never grind again with water that is past."

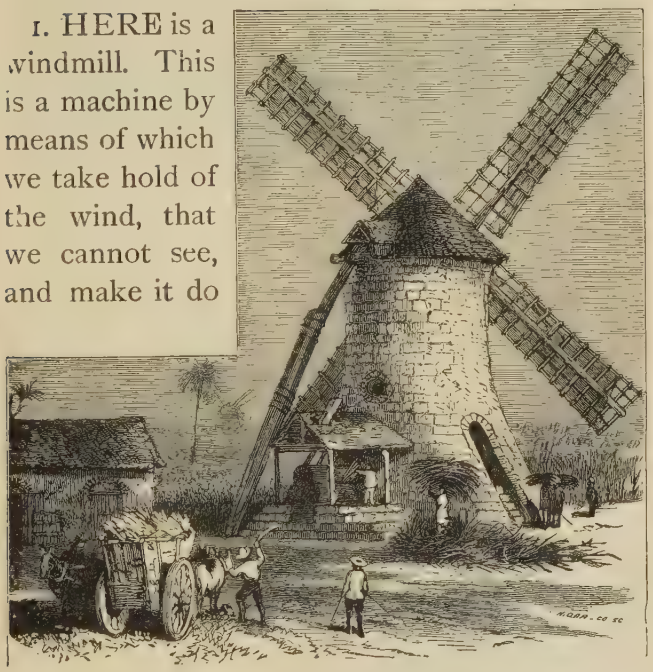
Work on while yet the sun doth shine, thou man of strength and will,
The streamlet ne'er doth useless glide by clicking water-mill;
Nor wait until to-morrow's light beams brightly on thy way.
For all that thou canst call thine own, lies in the phrase "to-day:"
Possessions, power, and blooming health, must all be lost at last,—
"The mill will never grind again with water that is past."

Oh! love thy God and fellow man, thyself consider last,
For come it will when thou must scan dark errors of the past;
Soon will this fight of life be o'er, and earth recede from view,
And heaven in all its glory shine where all is pure and true.
Ah! then thou'lt see more clearly still the proverb deep and vast,
"The mill will never grind again with water that is past."

D. C. McCallum.

XXXI. THE WINDMILL.

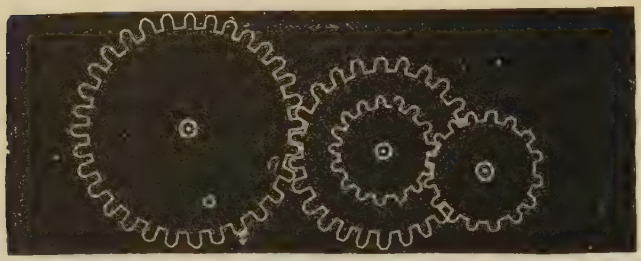
1. HERE is a windmill. This is a machine by means of which we take hold of the wind, that we cannot see, and make it do



Taking Sugar Cane to the Mill.

work that we can see. Windmills are often used in this country to grind wheat into flour, and corn into meal, and to crush sugar cane.

2. The large sails of the windmill turn a large shaft with a cog-wheel—that is, a strong iron wheel with teeth, called cogs, all around it. These teeth, or cogs, fit into the cogs of other



Blackboard Drawing. Cog-wheels. **Draw them by means of chalk and a piece of cord.**

wheels and make them go round, so that you can change in any way that is necessary the direction of the moving wheels. Thus a very large, round, and flat stone with a hole in the middle is made to turn around above another stone and very close to it.

3. If wheat is poured into the hole in the upper millstone it gets down between the stones, and there, as this upper millstone turns around, the wheat is ground into flour, which drops out all around the edges of the stone. Sometimes this is done by steam-mills. This flour is sifted, and put into barrels, and then sold to those who wish to make bread, biscuit, cakes, pies, or anything else from it. (*See picture on p.* 16.)

The earth gives the grain; fire gives its power to the steam-mill, and is used in baking the bread; water must be mixed with the flour to make dough; air must be got into the dough so as to raise it up and make it light; air also helps the windmill to grind the flour; it is, therefore, clear that fire, air, earth, and water all contribute to the making of our bread.

4. **In Holland,** where the land in some places is lower than the surface of the sea, hundreds of windmills are placed along the dikes for the same purpose. They can also be seen in this country near some large country-seats, where they are used to pump up water, so that it may be had in the highest stories of the houses.

5. Near one of the Prussian palaces in Potsdam stands a celebrated windmill. Frederick the Great desired to purchase it, that he might pull it down for the purpose of extending his gardens in that direction; the miller refused, and the king brought a suit against him, but was beaten in the court.

6. He then erected for the miller the present large mill, as a monument of Prussian justice. Some years since, the owner, having met with reverses, offered to sell the mill to the king, who immediately settled enough on the miller to defray his debts, saying the mill belonged to Prussian history, and should not be removed.

XXXII. A RAIN STORM IN JAPAN.

IN the midst of this sublime scenery, and at the very top of the pass, the rain, which had been light but steady during the whole day, began to come down in streams and then in sheets.

2. I had been so rained upon for weeks that at first I took little notice of it, but very soon changes occurred before my eyes which concentrated my attention.

3. The rush of waters was heard everywhere, trees of great size slid down, breaking others in their fall; rocks were rent and carried away trees in their descent, and the waters rose before our eyes.

4. With a boom and roar as of an earthquake a hillside burst, and half the hill, with a noble forest, was projected outwards, and the trees, with the land on which they grew, went down head foremost, diverting a river from its course; and where the forest-covered hillside had been there was left a great scar, out of which a torrent burst at high pressure, carving for itself a deep ravine, and carrying into the valley below a landslide of stones and sand.

5. Another hillside descended less abruptly, and its noble groves found themselves at the bottom in a perpendicular position, and will doubtless survive their transplantation.

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[1] **Sub-lime'**, grand.

[2] **Earth'quake**, violent shaking of a part of the earth.

6. Actually, before my eyes, this fine new road was torn away by hastily im'provised torrents, or blocked by landslips in different places, and a little lower, in one moment, a hundred yards of it disappeared, and with them a fine bridge, which was deposited across the torrent lower down.

7. On the descent, when things began to look very alarming, and the mountain-sides had become cascades bringing trees, logs, and rocks down with them, we were fortunate enough to meet with two pack-horses whose leaders were ignorant of the impassability of the road.

8. They said, if we hurried, we could just get to the hamlet they had left, but while they spoke the road and the bridge below were carried away. They insisted on lashing me to the pack-saddle for my safety. The great stream, whose beauty I had formerly admired, was now a thing of dread, and had to be crossed four times without fords.

9. It crashed and thundered, drowning the feeble sound of human voices; the torrents from the heavens hissed through the forests, trees and logs came crashing down the hillsides, a thousand cascades added to the din, and in our bewilderment we stumbled through the river, the men up to their shoulders. the horses up to their backs.

10. Again and again we crossed. The banks being carried away, it was very difficult to get either into or out of the water; the horses had to scramble or jump up places as high as their shoulders, all slippery and crumbling, and twice the men cut steps for them with axes.

11. The rush of the torrent at the last crossing taxed the strength of both men and horses, and as I was helpless from being tied on, I confess that I shut my eyes!

12. After getting through, we came upon the lands belonging to this village—rice fields with the dikes burst, and all the beautiful ridge and furrow cultivation of the other crops carried away.

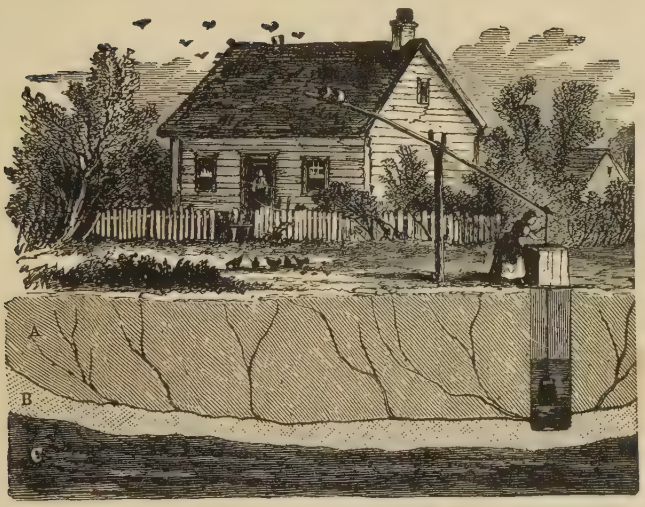
13. The waters were rising fast, the men said we must hurry; they unbound me, so that I might ride more comfortably, spoke to the horses and went on at a run.

14. My horse, which had nearly worn out his shoes in the fords, stumbled at every step.

15. A noose of rope was given me to clutch. The rain fell in such torrents that I speculated on the chance of being washed from my saddle, when suddenly I saw a shower of sparks.

16. I felt unutterable things; I was choked, bruised, stifled, and presently found myself being hauled out of a ditch by three men, and realized that the horse had stumbled in going down a steep hill, and that I had gone over his head.

From Miss Bird's "UNBEATEN TRACKS IN JAPAN."



Section of the Ground or Rock, showing how Wells are supplied.

A, *Ground or rock through which the rain-water sinks.*
C, *Rock or clay, which the water does not enter.*
B, *The part in which the water rests or flows.*

XXXIII. WELLS, SPRINGS, ETC.

1. You already know that people obtain fresh water from springs, lakes, and rivers. Where else is fresh water obtained? *From wells.*

2. When it rains, some of the water runs along on the surface or top of the ground and finds its way to a river; some of it is "dried up" or becomes vapor (page 21); and a great deal "soaks away," or sinks down into the ground. Where does that go? How far does it go? It finds its

way down either through soft, loose ground or gravel, or through crevices in the rock, and continues to sink until it is stopped by rock or clay, which it cannot penetrate. Therefore, if you should dig a pit or well down to a layer of sand in which the water rests or moves, some of it will, of course, flow into the well.

3. Water is brought up from a well by means of a bucket, or a chain pump, or a suction pump.

4. A chain pump is composed of an endless chain, which runs through a pipe.

5. A suction pump is one in which the water is made to rise by the weight or pressure of the air.

6. Air is everywhere, until it is displaced by something else; a cup or a pitcher, when said to be empty, is full of air.

7. Air has weight, and is moved just as water and sand have weight and are moved. Like water, air can be pumped.

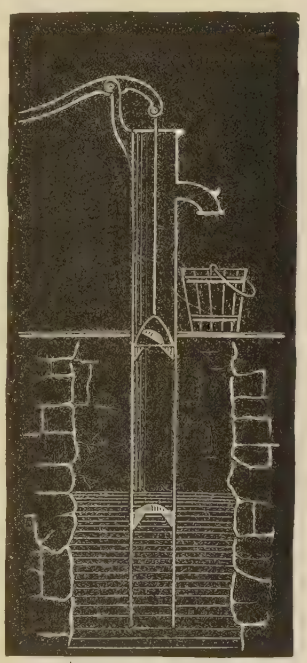
8. Air rests or presses on the land and also on the water in the ocean, a cup, or a deep well.

9. If you should remove the air from any spot on the water, you would see the water suddenly rise just at that spot, showing the pressure of the air on the surrounding portions.

10. If you should suck the air from a straw which has one end in a cup of water, you would see the effect of air pressure in the rising of the water in the straw.

11. When a pump is thus placed in a well, and the air removed from it, the water rises, because the air which rests on the water in the well presses it up.

12. In the first drawing, the water in the well and that in the pump are on the same level, because air is pressing down equally on the water both inside and outside of the pump.

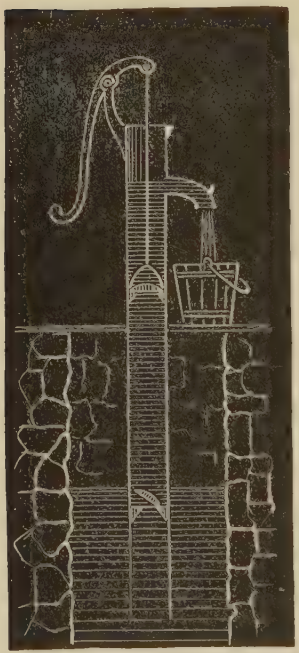


Rod going down—upper valve open, lower valve closed.

(In Blackboard Drawings, make the Pump thirty inches in length and three inches in diameter; and the well ten inches in diameter.)

13. The pump is provided with two little trap-doors called valves, which fit tightly. The lower valve is fixed, the other is moved up and down by means of an iron rod attached to the handle.

14. The upper valve removes the air from the pump, and immediately the water is pressed up and flows out at the spout.



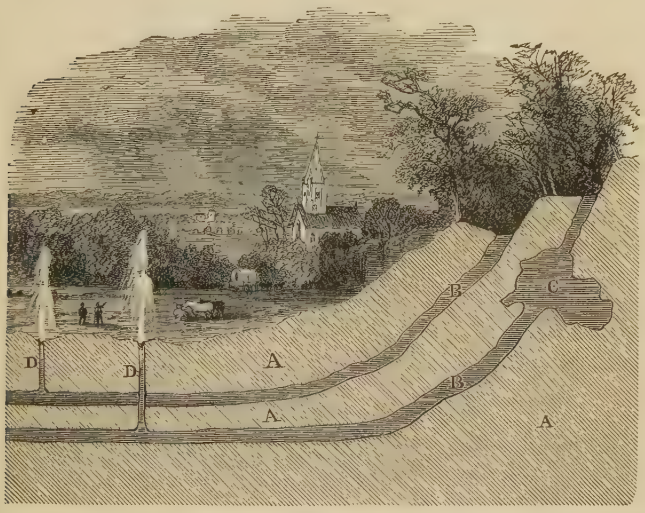
Rod coming up—Upper Valve closed—Lower Valve open.

15. The valves are so made that the water and air by pressing upwards open them and rise above them, but by pressing d o w n w a r d, close them; therefore, the valves prevent the return of the water through the pump into the well.

16. When the upper valve goes down, it is opened by the rush of air upward, but when it rises it is closed by the pressure of the air above it; a few strokes in this way remove the air from within the pump, and the consequence is that the air in the well, but outside of the pump, forces the water upward to fill the vac′-u-um.

17. Any space which contains nothing—not even air—is called a vacuum.

18. A vacuum may be formed by sucking the air from a small glass bottle, and the effect of the pressure of the surrounding air will be felt on your lips or tongue, perhaps painfully: and, if the glass be very thin, that pressure may crush the bottle.



Artesian Wells:—A, A, A, Rock or clay which water cannot penetrate;—B, B, Seams or Strata in which Subterranean Streams flow;—C, Subterranean Reservoir filled with Water by Rains;—D, D, Borings in the Ground or Rock.

19. A piece of leather, soaked in water and pressed down on a smooth pavement, adheres tightly to it by the pressure of the air on it. In this case a vacuum is formed between the leather or sucker and the pavement.

20. In some places men bore deep holes in the rock or ground, from which the water spurts up like fountains. Such are called Artesian Wells. They are not dug like common wells, but are drilled by long, sharp bars of iron or steel, about as thick as a man's arm.

21. These drilling or boring tools are lifted up into a high wooden tower by machinery, and let fall, as rocks are drilled for blasting. (Such a tower you may see in the chart.)

22. As soon as the bore enters a seam or channel in which water is confined by surrounding rock or clay, the water is pressed upward through this small opening. The pressure is exerted by the water which lies in these same underground channels and reservoirs on higher ground.

23. The underground seams serve as great pipes in holding and conducting water to great distances; and an Artesian well is like a burst in a pipe.

24. Artesian wells have been bored to depths of hundreds and even thousands of feet. By means of them an abundance of water is obtained even in deserts.

25. It is from such wells as these that the oil called petroleum is obtained, which is used for oiling machinery and for burning in lamps. It is from this that kerosene is now made.

26. The oil wells of **Pennsylvania, Ohio** and **West Virginia** furnish Europe with about fifty million dollars' ($50,000,000) worth of oil every year.

27. The origin of petroleum or rock-oil is variously attributed to vegetable, animal and mineral substances, which may have sunk, many years ago, below the earth's surface.

28. Some wells yield salt water, from which salt is obtained (pages 22 and 23). Large quantities of salt are thus made in New York, West Virginia and Michigan.

XXXIV. CAPES, ISLANDS, ETC.

1. Points of land which project into the water are called **Capes.** A high cape is called a Promontory. A light-house is seen in the Chart on a **Promontory:** and another on one of the capes.

Two of the best known capes are **Cape Horn** and **Cape Good Hope.**

2. A narrow neck or strip of land is called an **Isthmus;** and a narrow passage of water is called a **Strait,** sometimes a **Channel.** A well known isthmus is that of **Panama,** or Darien, which joins North and South America. A well known strait is that of **Gibraltar,** which connects the **Mediterranean Sea** with the **Atlantic Ocean;** another is **Behring Strait,** which separates North America from Asia and connects the Arctic with the Pacific Ocean; another, called **Davis Strait,** connects Baffin Bay with the Atlantic; and another, called **Hudson Strait,** connects Hudson Bay with the Atlantic.

3. These straits received their names from distinguished navigators who discovered them.

4. Hudson entered Hudson Strait and discovered Hudson Bay, which he thought was the Pacific Ocean; but, of course, he was mistaken. He also explored Hudson River.

5. What is the difference between an Island and a Peninsula? *An Island is entirely surrounded by water, and a Peninsula is almost surrounded by water.*

On a map of the world you may find the following islands:

6. **Australia**, which is the largest island in the world, and is celebrated for its rich gold mines and large flocks of sheep. **Borneo**, which is crossed by the Equator and is very hot. The **British Isles**, which include England, Scotland, Wales, and Ireland. The **Japan Islands**, which have almost as many inhabitants as the United States. The **West Indies**, which have a warm climate and produce sugar and oranges. The **Friendly** and the **Society Islands**, also warm, which produce bananas and cocoanuts.

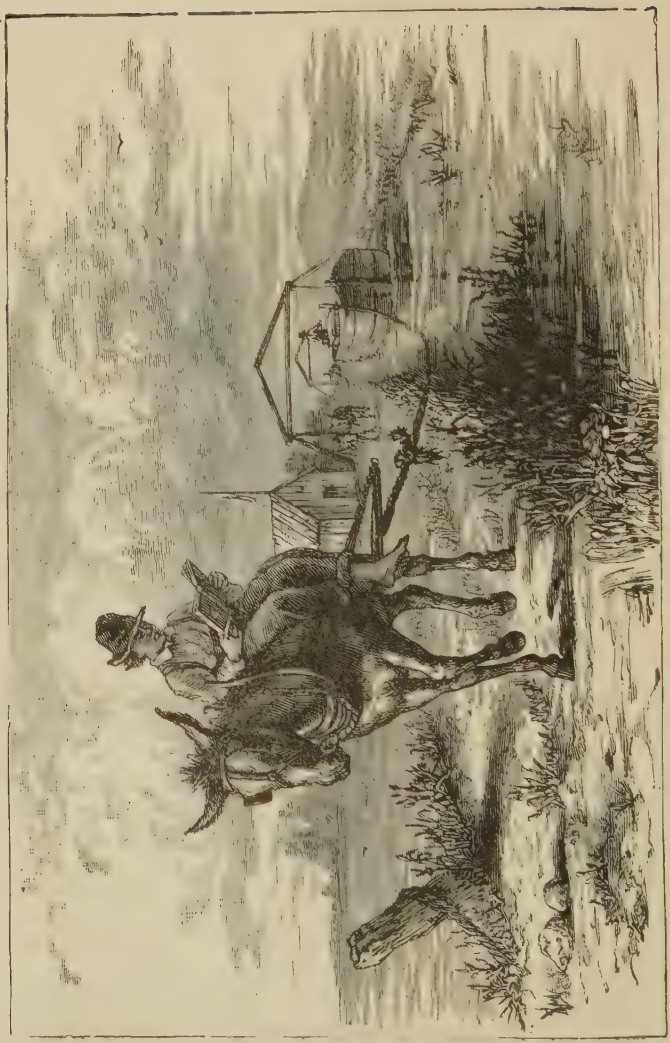
7. A little west of the center of the Chart you may see a **Tunnel** cut through the solid rock for trains to pass through. A celebrated tunnel is in the western part of Massachusetts. It is cut through the mountains and is nearly five miles long; it is the Hoosac Tunnel. The Mount Cenis (*se-ne'*) tunnel through the Alps is nearly eight miles long. Several tunnels

pass under the Thames, the river which flows through the city of London. It is proposed to construct a railroad tunnel under the Hudson River between New York and Jersey City.

Emigrants crossing the Mountains—a Mountain Pass.

8. Not far from the tunnel you may see a company of emigrants* on their way west. They may be from some of the large cities of the States, or they may have lately arrived in this country from Germany, England, Sweden, Norway, or other part of Europe, intending to buy land in one of our Western States or Territories and become industrious farmers.

* In the Country or State which they leave they are called Emigrants; in that which they enter, Immigrants.



XXXV. CANALS.

IN the chart you may see a canal with several locks and gates. Canal-boats are drawn by horses or mules. Some are moved by steam. Canals are artificial rivers.

2. There is one in the State of New York that is three hundred and fifty-two miles long. It reaches from **Lake Erie** to the **Hudson River**; and this canal has done much to make the city, as well as the State, of **New York** so large and wealthy as it is.

3. If you will look at your map you will see that any kind of produce from the farms, the forests, or the mines can be brought by vessels from the far western shore of **Lake Superior** or of **Lake Michigan,** many hundreds of miles distant, all the way by water to **Buffalo,** thence by this long canal to the **Hudson River,** and down this river to the wharves of **New York City,** from which it can reach all the navigable waters in the world. This water-carriage is the cheapest of all. There are no rails to be paid for or to put down, but any man can move about wherever he chooses, up and down the navigable rivers, or to and fro for thousands of miles "over the broad bosom of the ocean."

4. Look at the map, and you will see that a sailing

voyage from Lake Superior or Lake Michigan includes **Lake Huron** and **Lake Erie.**

5. The only difficulty about some canals is that they will freeze up in winter. Then the railroads get the better of them, and carry large quantities of goods during the long winter months.

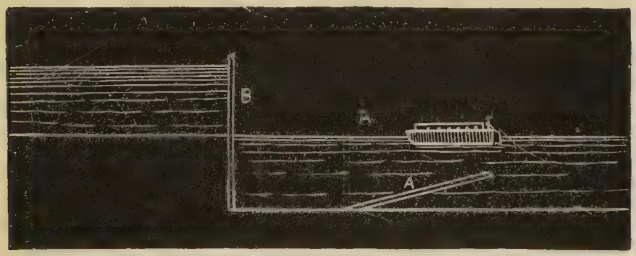
6. This large canal, however, which is called the Erie Canal, is only about half as long as one in **China,** which runs from the great city of **Pekin** to the great river **Yangtse Kiang.** There are said to be about four hundred canals in **China.**

7. These are used not only as water highways to float goods or produce from place to place, but also for irrigation—that is, to water the fields, so that the plants may grow better, and thus yield a more abundant crop.

8. In **Egypt,** where it very seldom rains, the land is watered in this way by water from the **Nile River.**

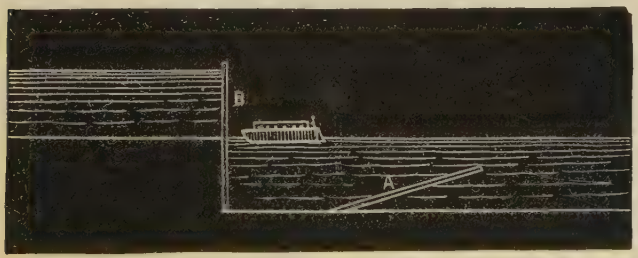
9. In canals they have a curious way of making boats climb up hill; for canals must sometimes be made on ground that is high in one part and low in another. Where a high and a low level meet, as shown in the blackboard drawing, it is necessary to build what is called a lock, perhaps because it locks the parts together. This is a shaft or well-hole of stone, carefully laid in cement so as to be water-tight, extending down from the upper to the lower level

of the canal with a gate on one side, at the bottom, opening into the lower level, and another on the opposite side, at the top, opening into the upper level. These gates or doors can be shut so as to be water-tight.



Canal. A boat at low level about to enter a lock so as to reach the upper level. Lower gate, A, opens to admit boat; upper gate, B, closed.

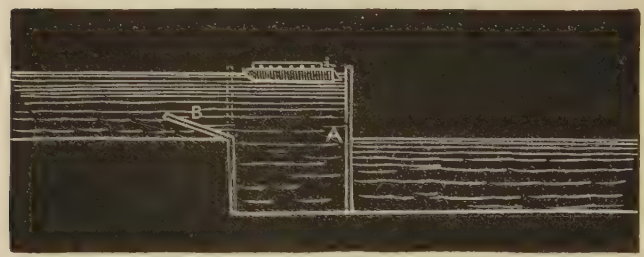
10. When a boat is to go up hill, the door at the top being closed, the one at the bottom is opened, and the boat floats through into the lock.



Boat in canal-lock, lower gate, A, about to be closed. Water to be let into lock from upper canal until the lock is full.

11. That door is then closed and the upper one, or a valve in it, is gradually opened, letting

the water run down into the lock until the water in the lock is on a level with that in the upper canal. The upper door or gate is then opened, and the boat floats out upon the upper level.

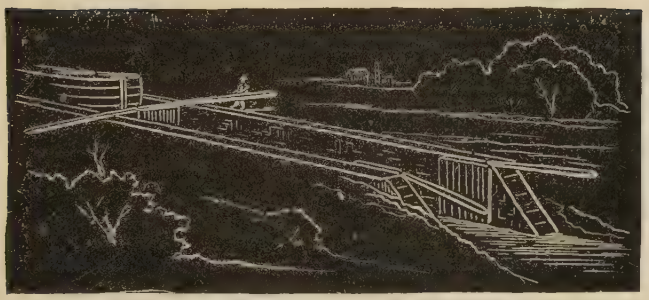


Upper gate, B, is opened, and the boat enters upper canal.

12. Where a canal passes through land which is hilly or sloping, there are sometimes so many locks as to resemble a flight of stairs, as shown on the chart, in the middle-ground.

13. Canal-boats going from **Albany** to **Buffalo** on the Erie Canal must ascend, as shown in the drawing above; so also on the **Welland Canal,** from Lake Ontario to Lake Erie; and on the Canal by which steamboats on their way from **Montreal** to **Lake Ontario** avoid the rapids in the **St. Lawrence River.**

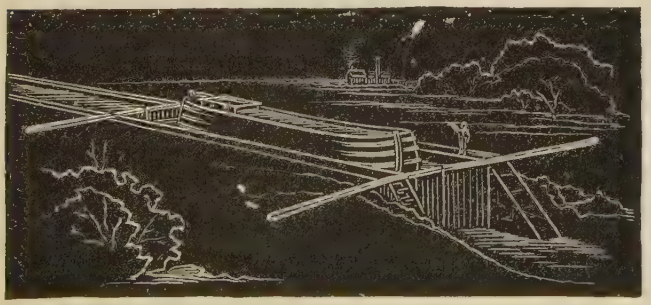
14. Welland Canal is the only route by which boats can sail between Lakes Erie and Ontario, because the falls (160 feet high) in **Niagara River** render navigation between these two lakes impossible by way of that river.



Boat descending and about to enter the lock.

15. When a boat is to go from a high to a low level, the order of opening and closing the gates is simply reversed.

16. When the boat reaches the upper, closed gates, the lower gates are closed; then the water is let into the lock until it is full. The upper gates are then swung open against the sides of the canal and the boat enters the lock.



Boat in lock, and about to descend to the lower level.

17. **It is now easy** to see that by letting the water out of the lock and by opening the lower gates, the upper gates remaining closed, the boat settles down with the water and passes out on the lower level.

XXXVI. THE LEAK IN THE DIKE.

A STORY OF A BRAVE BOY IN HOLLAND.

THE good dame looked from her cottage
At the close of the pleasant day,
And cheerily called to her little son
Outside the door at play:
"Come, Peter, come! I want you to go,
While there is light to see,
To the hut of the blind old man who lives
Across the dike, for me;
And take these cakes I made for him,
They are hot and smoking yet;
You have time enough to go and come
Before the sun is set."

Then the good-wife turned to her labor,
Humming a simple song,
And thought of her husband, working hard
At the sluices all day long;
And set the turf a-blazing,
And brought the coarse black bread;
That he might find a fire at night,
And find the table spread.

And Peter left the brother,
With whom all day he'd played,
And the sister who had watched their sports
In the willow's tender shade;

And told them they'd see him back before
They saw a star in sight,
Though he wouldn't be afraid to go
In the very darkest night!

For he was a brave, bright fellow,
With eye and conscience clear;
He could do whatever a boy might do,
And he had not learned to fear.
Why, he wouldn't have robbed a bird's nest
Nor brought a stork to harm,
Though never a law in Holland
Had stood to stay his arm!

And now, with his face all glowing,
And eyes as bright as the day
With the thoughts of his pleasant errand,
He trudged along the way;
And soon his joyous prattle
Made glad a lonesome place—
Alas! if only the blind old man
Could have seen that happy face—
Yet he somehow caught the brightness
Which his voice and presence lent;
And he felt the sunshine come and go
As Peter came and went.

And now, as the day was sinking,
And the winds began to rise,
The mother looked from her door again
Shading her anxious eyes;

And saw the shadows deepen,
And birds to their homes come back,
But never a sign of Peter
Along the level track.
But she said, "He will come at morning,
So I need not fret or grieve—
Though it isn't like my boy at all
To stay without my leave."

But where was the child delaying?
On the homeward way was he,
And across the dike while the sun was up
An hour above the sea.
He was stopping now to gather flowers,
Now listening to the sound,
As the angry waters dashed themselves
Against their narrow bound.

"Ah! well for us," said Peter,
"That the gates are good and strong,
And my father tends them carefully,
Or they would not hold you long!"
"You're a wicked sea," said Peter:
"I know why you fret and chafe;
You would like to spoil our lands and homes
But our sluices keep you safe!"

But hark! Through the noise of waters
Comes a low, clear, trickling sound;
And the child's face pales with terror,
And his blossoms drop to the ground.

He is up the bank in a moment,
And, stealing through the sand,
He sees a stream not yet so large
As his slender, childish hand.
'Tis a leak in the dike! He is but a boy,
Unused to fearful scenes;
But, young as he is, he has learned to know
The dreadful thing that means.

A leak in the dike! The stoutest heart
Grows faint that cry to hear,
And the bravest man in all the land
Turns white with mortal fear.
For he knows the smallest leak may grow
To a flood in a single night;
And he knows the strength of the cruel sea
When loosed in its angry might.

And the boy! He has seen the danger,
And, shouting a wild alarm,
He forces back the weight of the sea
With the strength of his single arm!
He listens for the joyful sound
Of a footstep passing nigh;
And lays his ear to the ground to catch
The answer to his cry.
And he hears the rough winds blowing,
And the waters rise and fall,
But never an answer comes to him,
Save the echo of his call.
He sees no hope, no succor,
His feeble voice is lost;

Yet what shall he do but watch and wait,
Though he perish at his post.

So, faintly calling and crying
Till the sun is under the sea,
Crying and moaning till the stars
Come out for company;
He thinks of his brother and sister,
Asleep in their safe, warm bed;
He thinks of his father and mother,
Of himself as dying—and dead;
And of how, when the night is over,
They must come and find him at last;
But he never thinks he can leave the place
Where duty holds him fast.

The good dame in the cottage
Is up and astir with the light,
For the thought of her little Peter
Has been with her all night.
And now she watches the pathway,
As yester-eve she had done;
But what does she see so strange and black
Against the rising sun?
Her neighbors are bearing between them
Something straight to her door;
Her child is coming home, but not
As he ever came before.

"He is dead!" she cries; "my darling!
And the startled father hears,
And comes and looks the way she looks
And fears the thing she fears:

Till a glad shout from the bearers
Thrills the stricken man and wife—
"Give thanks, for your son has saved our land,
And God has saved his life!"
So, there in the morning sunshine
They knelt about the boy;
And every head was bared and bent
In tearful, reverent joy.

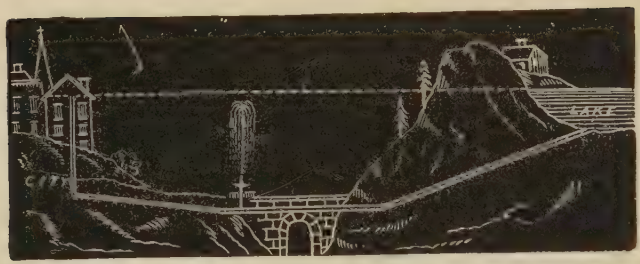
'Tis many a year since then; but still,
When the sea roars like a flood,
Their boys are taught what a boy can do
Who is brave and true and good.

For every man in that country
Takes his son by the hand,
And tells him of little Peter,
Whose courage saved the land.

They have many a valiant hero
Remembered through the years;
But never one whose name so oft
Is named with loving tears.
And his deed shall be sung by the cradle,
And told the child on the knee,
So long as the dikes of Holland
Divide the land from the sea.

CARY.

PHŒBE CARY, an American poetess, born in Ohio in 1826. She and her older sister Alice were both talented and successful writers of prose and poetry, and constant contributors to the leading literary periodicals of this country.



Aqueduct supplying city with water from lake. Dotted line shows the level of the lake's surface, and the height to which its water may rise in the aqueduct and pipes.

XXXVII. AQUEDUCTS AND BRIDGES.

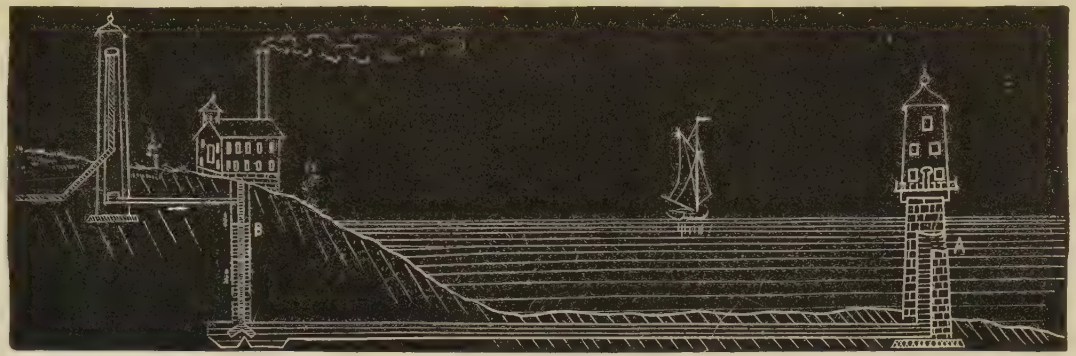
1. On this part of the chart you see a reservoir (pointing to it). It receives fresh water from the lake beyond and above it, and supplies the city by means of an aqueduct, as shown in the blackboard drawings.

2. An aqueduct is a long pipe for conducting water. It is made of lead or iron or earthenware, or sometimes it is a large tube of masonwork covered over smoothly with cement so as to be water-tight.

3. Near the reservoir is a tower or stand-pipe, into which water is pumped high enough to supply buildings which are higher than the reservoir.

4. A tube or pipe can conduct water downwards, then upwards as high as its source, but no higher, on the principle that "water always seeks a level."

5. A most extraordinary aqueduct supplies the **City of Chicago** with water. It runs under the bottom of **Lake Michigan** for two miles, and communicates with a large iron pipe, which rises nearly to the surface of the lake. (See blackboard drawing.) The **City of Cleveland, Ohio,** is supplied with pure water from **Lake Erie** in a similar manner.



Blackboard Drawing to show how Chicago is supplied with fresh water from Lake Michigan. The water enters the pipe at A, fills the aqueduct or tunnel, and rises as far as B, the level of the lake. From B, it is pumped up into the tower or stand-pipe, from which the city receives a supply.

Suspension Bridge over East River between New York and Brooklyn. New York is west of the East River.

II. Bridges.

A Suspension Bridge is made by building two tall piers and stretching over them large wire ropes or cables.

2. To these cables are fastened iron rods which hold the floor on which people walk, wagons and trains of cars pass.

3. The oldest suspension bridges are in China. The Indians in South America make them of bark ropes, and sometimes, instead of a floor for the traveler to walk on, there is a bas-

ket into which he is put, and in which he is pulled over from one side of a river to the other.

4. One of the finest suspension bridges in the world is at **Niagara.** It has a span of over 800 feet, and is nearly 250 feet above the **Niagara River.** This bridge is so strong that ordinary trains pass over it.

5. Another at **Cincinnati,** over the **Ohio River,** is more than 2,200 feet in length. Its height above the water is about 100 feet.

6. The largest suspension bridge, most probably, in the world is that between **New York** and **Brooklyn** over the **East River.** It is 3,475 feet long between the anchorages, with a clear span over the river of 1,595 feet. The bottom of it is 135 feet above the water.

7. Light suspension bridges are sometimes broken by too much vibration. This happened to a small bridge over the river **Loire,** in **France,** at a place called Angers.

8. A lieutenant in command of a party of soldiers marched them in the usual way, without causing them to break step. As their regular tramp, tramp was felt by the bridge, it began to swing, and went on swinging more and more, until it finally broke from its fastenings and precipitated those on it into the river, where several of them were killed.

9. Suspension bridges are so called because the floor or roadway is hung or suspended from the curved cables. Other bridges are built of stone, iron, wood, or brick; their roadways are usually over or alongside of the arches.

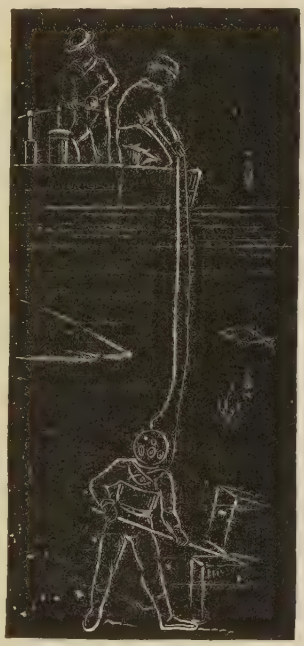
10. A most remarkable bridge (not suspension) is that which crosses the **Mississippi River** at the great city of **St. Louis.** This bridge is chiefly of steel, its three immense arches resting on four stone piers. Each span is over 500 feet in extent. There are two roadways, one above the other.

One span of the St. Louis Bridge. Add the two other arches or spans, each ten inches on the blackboard and similar to this.

In what direction does the Mississippi River flow? *South.* In what State does it rise or begin? *Minnesota.* In what State does it end? *Louisiana.* What large rivers flow into it? *Missouri, Arkansas, Red, and Ohio.*

11. When you look at the foundations of bridges, lighthouses, and stone piers which are under water, you doubtless wonder how the masons built them. I shall now tell you. One way is to sink or drive down heavy timbers or piles around the place selected for the foundation, fill all around and between these with stone, clay, and cement, and pump out the water from the enclosure; the workmen then descend and build the foundation.

12. Another way is simply for the workman to put on a peculiar kind of a suit made of India-rubber, which completely covers him and keeps out the water. Glass is fixed in the helmet for him to see through. Of course, he must have air to breathe; that is supplied by a hose or tube leading from the inside of his suit or covering up to a boat, where other men are carefully pumping air to him through the hose. In such suits, men go under the water to examine and repair ships, recover wrecks, sunken treasures, etc.



A Man in a Diver's Suit or Armor building a Foundation under Water.

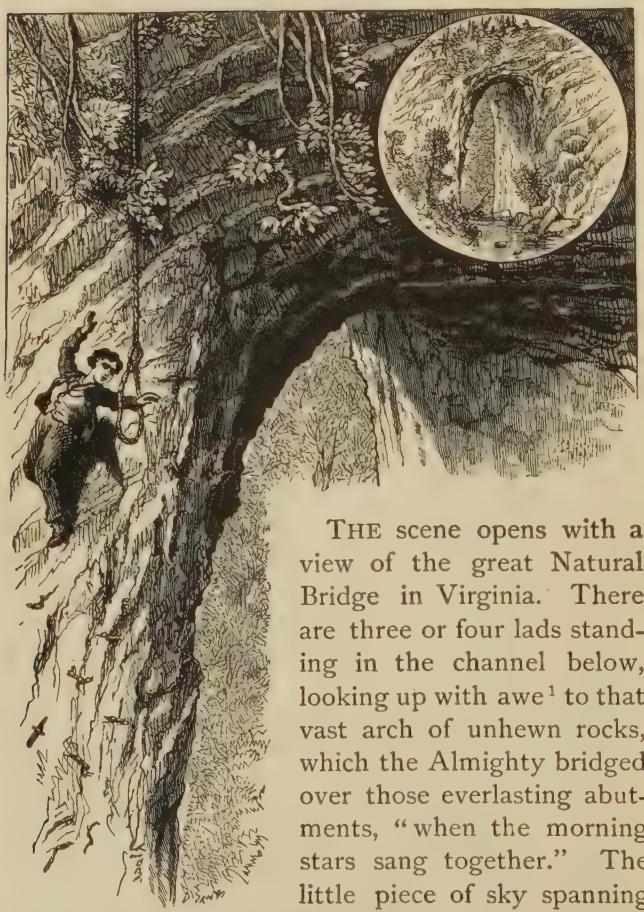
13. The diving-bell is another means by which men descend and work in the water.

14. Its principle is seen in pressing any vessel like a tumbler into the water, with its mouth downward.

15. The air confined in the tumbler keeps the water out and displaces it, just as a block or a stone would do.

16. Fresh air is pumped into the diving-bell as shown above.

XXXVIII. THE NATURAL BRIDGE.



THE scene opens with a view of the great Natural Bridge in Virginia. There are three or four lads standing in the channel below, looking up with awe[1] to that vast arch of unhewn rocks, which the Almighty bridged over those everlasting abutments, "when the morning stars sang together." The little piece of sky spanning

[1] **Awe,** *aw,* not *ore.*

The Natural Bridge is situated 115 miles west of Richmond, Virginia.

those measureless piers[1] is full of stars, although it is mid-day. It is almost five hundred feet from where they stand, up those perpendicular bul'warks of limestone to the key of that vast arch, which appears to them only the size of a man's hand. The silence of death is rendered more impressive by the little stream that falls from rock to rock down the channel. The sun is darkened, and the boys have uncovered their heads, as if standing in the presence-chamber of the Majesty of the whole earth.

2. At last this feeling begins to wear away; they look around them, and find that others have been there before them. They see the names of hundreds cut in the limestone abutments. A new feeling comes over their young hearts, and their knives are in their hands in an instant. "What man has done, man can do," is their watchword, while they draw themselves up and carve their names a foot above those of a hundred full-grown men who have been there before them.

3. They are all satisfied with this feat of physical[2] exertion except one, whose example illus'trates perfectly the forgotten truth, that there is "no royal road to learning." This ambitious youth sees a name just above his reach—a name which will be green in the memory of the world when those of Alexander,[3] Cæsar, and Bonaparte[4] shall have rotted in oblivion.[5]

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[1] **Piers,** *peers.*
[2] **Physical,** *fiz'e-kal.*
[3] **Alexander,** *Al-ex-an'der,* not *èl.*
[4] **Bonaparte,** *bō-na-part.*
[5] **Oblivion,** *ob-liv'e-on.*

4. It was the name of WASHINGTON. Before he marched with Brad'dock to that fatal field, he had been there and left his name, a foot above any of his pred-e-ces'sors. It was a glorious thought to write his name side by side with that great "Father of his country."

5. He grasps his knife with a firmer hand, and clinging to a little jutting crag, he cuts again into the limestone, about a foot above where he stands; he then reaches up and cuts another for his hands.

6. 'Tis a dangerous adventure; but as he puts his feet and hands into those gains, and draws himself up carefully to his full length, he finds himself a foot above every name chronicled[1] in that mighty wall.

7. While his companions are regarding him with concern and admiration, he cuts his name in wide capitals, large and deep, in that flinty album.[2] His knife is still in his hand, and strength in his sinews,[3] and a new created aspiration in his heart.

8. Again he cuts another niche,[4] and again he carves his name in larger capitals. This is not enough; heedless of the entreaties of his companions, he cuts and climbs again.

9. The gradations of his ascending scale grow wider apart. He measures his length at every gain he cuts. The voices of his friends wax[5] weaker and weaker, till their words are finally lost on his ear. He now for the first time casts a look beneath him.

---

[1] **Chronicled**, *kron'e-kuld.*

[2] **Album**, *ăl'bum.*

[3] **Sinews**, *sin'uze.*

[4] **Niche**, *nitsh.*

[5] **Wax**, grow.

10. Had that glance lasted a moment, that moment would have been his last. He clings with a convulsive shudder to his little niche in the rock. An awful abyss[1] awaits his almost certain fall. He is faint with severe exertion and trembling from the sudden view of the dreadful destruction to which he is exposed.

11. His knife is worn half-way to the haft. He can hear the voices but not the words of his terror-stricken companions below.

12. What a moment! What a meagre[2] chance to escape destruction! There is no retracing his steps. It is impossible to put his hands into the same niche with his feet, and retain his slender hold a moment.

13. His companions instantly perceive his new and fearful dilemma,[3] and await his fall with emotions that freeze their young blood. He is too high to ask for his father and mother, his brother and sister, to come and witness or avert his destruction. But one of his companions anticipates his desire.

14. Swift as the wind, he bounds down the channel, and the situation of the fated boy is told upon his father's hearthstone.[4] Minutes of almost eternal length roll on, and there are hundreds on the bridge above, all holding their breath, and waiting the fearful catastrophe.

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[1] **Abyss,** *ä-bis.'*

[2] **Meagre,** *mē'ghur.*

[3] **Dilemma,** *di-lem'mä.*

[4] **Hearthstone,** *härth-stone.*

15. The poor boy hears the hum of new and numerous voices both above and below. He can just distinguish the tones of his father, who is shouting with all the energy of despair—"William! William! don't look down! Your mother, and Henry, and Harriet are all praying for you! Don't look down! Keep your eyes toward the top!"

16. The boy didn't look down. His eye is fixed like a flint towards Heaven, and his young heart on Him who reigns[1] there.

17. He grasps again his knife. He cuts another niche, and another foot is added to the hundreds that remove him from the reach of human help below.

18. How carefully he uses his wasting blade! How anxiously he selects the softest places in that vast pier! How he avoids every flinty grain! How he economizes[2] his physical power, resting a moment at each gain he cuts! How every motion is watched from below! There stand his father, mother, brother and sister on the very spot where, if he fall, he will not fall alone.

19. The sun is half way down in the west. The lad has made fifty additional niches in that mighty wall, and now finds himself directly under the middle of that vast arch[3] of rock, earth, and trees. He must cut his way in a new direction, to get from this over-hanging mountain.

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[1] **Reigns,** *rānes.* [2] **Economizes,** *ē-kŏn'ō-mīz-ez.*
[3] **Arch,** *artsh.*

20. The inspiration of hope is in his bosom; its vi'tal heat is fed by the increasing shouts of hundreds perched[1] upon cliffs, rocks, and trees, and of others who stand with ropes in their hands upon the bridge above, or with ladders below.

21. Fifty more gains must be cut before the longest rope can reach him. His wasting blade strikes again into the limestone. The boy is emerging[2] painfully, foot by foot, from under that lofty arch. Spliced[3] ropes are in the hands of those who are leaning over the outer edge of the bridge. Two minutes more, and all will be over.

22. The blade is worn to the last half inch. The boy's head reels; his eyes are starting from their sockets. His last hope is dying in his heart; his life must hang upon the next gain he cuts. That niche is his last.

23. At the last flint gash he makes, his knife—his faithful knife—falls from his little nerveless hand, and ringing along the precipice, falls at his mother's feet. An involuntary groan of despair runs like a death-knell through the channel below, and all is still as the grave.

24. At the height of nearly three hundred feet, this fainting boy lifts his devoted heart and closing eyes to commend his soul to GOD. 'Tis but a moment—there! One foot swings off! He is reeling, trembling—toppling over into eternity!

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[1] **Perched,** *purtshd.* [2] **Emerging,** *e-merg'ing.*
[3] **Spliced,** *splīsd.*

25. Hark!—a shout falls on his ears from above! The man who is lying with half his length over the bridge, has caught a glimpse of the boy's head and shoulders.

26. Quick as thought, the noosed rope is within reach of the sinking youth. No one breathes. With a faint convulsive effort, the swooning boy drops his arm into the noose.

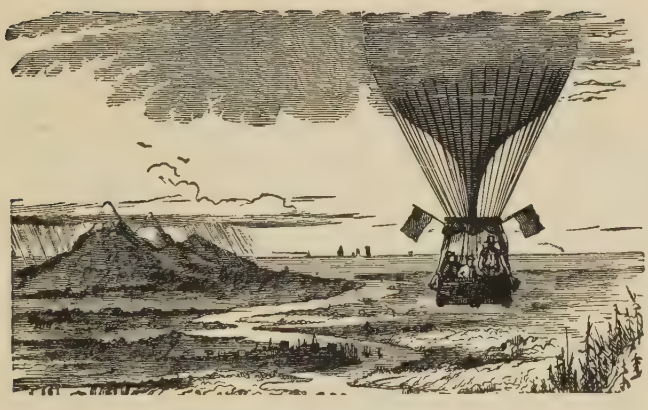
27. Darkness comes over him and with the words "GOD!" and "Mother!" whispered on his lips just loud enough to be heard in heaven—the tightening rope lifts him out of his last shallow niche.

28. Not a lip moves while he is dangling over that fearful abyss; but when a sturdy Virginian reaches down and draws up the lad, and holds him up in his arms before the tearful, breathless multitude—such shouting! and such leaping and weeping for joy never greeted a human being so recovered from the yawning gulf of eternity.

BURRITT.

ELIHU BURRITT, the son of a shoemaker, was educated in the common schools, and at the age of 16 apprenticed to a blacksmith. In the intervals of labor he read and studied much, mastered several languages, and became author, editor, lecturer, and United States Consul at Birmingham, England. He was known as "The Learned Blacksmith." He was born in Connecticut in 1811.

Each pupil may write a letter or composition about the Natural Bridge, and describe this adventure in his or her own language. Do not copy any part. On what occasion did Washington march with Braddock? Who was Braddock? What was his fate? How old was Washington when he served under Braddock? Write what you know of the battle in which Braddock was killed.



Excursion in a Balloon.

XXXIX. BALLOONS.

1. Here is a balloon. The first balloons were made in 1783, of paper, and were made to rise by heated air coming from chopped straw that was burned in a wire grating below them. This heated air, being lighter than the common air about it, makes the balloon rise up, just as a cork does in water. (Afterwards pure hydrogen gas was used, and then carburetted hydrogen, which is what we burn in our houses.)

2. The first man who ever dared to go up in a balloon was a young Frenchman (named De Rozier), who was killed two years after (1785) by the burning of his balloon. Two persons crossed the **Straits of Dover** in a balloon in that same year. The first woman balloonist (Madame Blanchard), after several ascensions, attempted to set off some

fireworks while rising up from a garden near Paris in 1796. Her balloon caught fire, and she was dashed to pieces.

3. An English a'er-o-naut or balloonist made 1,400 ascensions, crossing the **English Channel** three times and falling into it twice. In the highest strata of air reached by balloons men suffer severely from cold, no matter how hot the day may be on the ground they leave. The breathing becomes difficult, the pulse much quickened, and the throat parched. The highest mountain in the world is 5½ miles high, but in 1862 two Englishmen ascended to the height of 37,000 feet, or 7 miles. Both, however, were nearly killed by the cold.

4. A balloon moves about very easily in the air, so that a very slight change of weight will affect it seriously.

5. Soon after the invention of balloons they were used in war, being held fast by a long rope, while some officers looked down from them to see what was going on in the enemy's camp.

6. In the last war in the United States a balloon corps (*kor*) was organized, and news was telegraphed from these balloons to headquarters.

7. On one occasion General Fitz-John Porter was observing the enemy's lines from a balloon, when the rope broke and he was carried rapidly towards the enemy. Pulling the valve-string, he caused an escape of gas. This admitted enough outside or heavier air, lowered the balloon and brought him into a different current of air, which fortunately took him back to where he started from.

8. When **Paris** was besieged by the Germans in 1870, fifty-four balloons were sent off at different times by the

Post-office Department. These carried millions of letters. Sixty-two were sent off in all during the siege, mostly at night, so as to escape the observation of their enemies, the Germans.

9. In spite of all precautions, several fell within the enemy's lines. One was fired at while crossing the Prussian outposts. Several were carried outside of **France.** One was swept into **Norway,** and landed 600 miles north of the city of Christiania. Three were never heard of after they set out, and were most probably lost in the **Atlantic Ocean.**

10. Some men who wished to get out of the besieged city went in these balloons as passengers. Among these was a member of the Provisional Government, the now famous Gambetta, who, voyaging safely through the air, arrived at the city of Tours, where he joined his colleagues in the government.

SPELLING AND WRITING EXERCISE.

Balloon,	*heated,*	*chopped,*
English,	*aeronaut,*	*crossing,*
breathe;	*breathing,*	*pulse,*
parched,	*weight,*	*officer,*
post-office,	*siege,*	*escape,*
heavy,	*heavier,*	*easy,*
ascend,	*difficult,*	*throat,*
corps,	*enemy,*	*easily.*

Why does a balloon rise in the air? What causes it to come down? What about the temperature of the air through which it ascends?

XL. A TRIP IN A BALLOON ACROSS THE ADRIATIC SEA.

THERE is not a more moving story than that of an Italian count or nobleman who, during an aerial[1] journey on October the 7th, 1804, was cast away on the waves of the Adriatic.[2]

2. He with two companions entered the balloon, they rose gently at first and hovered over the town of Bologna.[3]

3. The count says: "We rose higher and higher; it became very cold. It was now two o'clock. The compass had been broken, and was useless; the wax light in the lantern would not burn in such a rarefied[4] atmosphere.

4. "We descended gently across a thick layer of whitish clouds, and when we had got below them, we heard a sound, muffled and almost inaudible, which he immediately rec'ognized as the breaking of waves in the distance.

5. "Instantly I saw this new and fearful danger. The sound of the waves, tossing with wild uproar, became louder and louder, and I suddenly saw the surface of the sea violently agitated just below us.

---

[1] **Aerial,** *ā-ē're-al.*
[2] **Adriatic,** *ad-re-at'ik.*
[3] **Bologna,** *bo-lone'yah.*
[4] **Rarefied,** *răr'e-fied.*

6. "I immediately seized a large sack of sand, but had not time to throw it over before we were all in the water, gallery and all. In the first moment of fright, we threw into the sea everything that would lighten the balloon—our ballast, all our instruments, a portion of our clothing, our money, and the oars. As, in spite of all this, the balloon did not rise, we threw over our lamp also.

7. "After having torn and cut away everything that did not appear to us to be of indispen'sable necessity, the balloon, thus very much lightened, rose all at once, but with such rapidity and to such a prodigious elevation, that we had difficulty in hearing each other, even when shouting at the top of our voices.

8. "I was very ill; one of my companions was bleeding at the nose; we were all breathing short and hard, and felt oppression on the chest.

9. "After having been at an immeasurable elevation for half an hour, the balloon slowly began to descend and at last we fell again into the sea.

10. "The night was very dark, the sea rolling heavily; it must have been in the middle of the Adriatic that we fell. Although we descended gently, the gallery was sunk, and we were often entirely covered with water.

11. "The wind pressed against the half empty balloon as against a sail, so that by means of it we were dragged and beaten about at the mercy of the storm and the waves.

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[1] **Prodigious,** *pro-did'jus.*

12. "At daybreak we found ourselves four miles from the shore. We were comforting ourselves with the prospect of a safe landing, when a wind from the land drove us with violence away over the open sea.

13. "It was now full day, but all we could see were the sea, the sky, and the death that threatened us. Certainly some boats happened to come within sight; but no sooner did their men see the balloon floating and shining upon the water than they hurried to get away from it.

14. "At last, one man better informed than those we had seen before, recognized our machine to be a balloon, and quickly sent his long-boat to our res'cue. The sailors threw us a stout cable which we attached to the gallery, and by means of which they res'cued us when fainting from exposure.

15. "The balloon, thus lightened, rose in the air and, in spite of all the efforts of the sailors who wished to capture it, disappeared for ever from our view. It was eight o'clock in the morning when we were taken on board.

16. "The brave captain of the vessel did everything in his power to restore us. All were very sick; I was compelled to have my hands amputated."

If you were above in a balloon and wished to return to the surface, what would you do? If the balloon should descend too rapidly or come too near high trees, what would you do to make it rise? Of what are balloons made?

Ascending to great heights, extreme cold is not the only danger met with. Our lungs are used to working under a pressure or weight of air of 15 pounds to a square inch. At the height of 4 or 5 miles, the air is not so dense as it is at the surface; and, consequently, breathing and the circulation of the blood are seriously disturbed; the blood unpurified becomes dark, and unless the person descends to lower and denser air at once, he dies of blood poisoning.

PART II.

Trees and Plants,

Mining,

Birds,

Quadrupeds,

Insects.

I. TREES AND PLANTS.

An Apple-Tree.

1. Trees and other plants are very useful to us, and we ought to be very grateful for them. We eat them, we wear them, we walk on them, we sit on them, we sleep on them, and are sheltered by them all day and all night. Our shirts and collars of muslin and of linen are given us by the cotton-plant and the flax. We sit down on chairs of oak or maple, or some other wood, which rest on a wooden floor, on which we walk. For our dinner-table the potato-plant has sent us its roots, or rather tubers; the wheat or rye gives us our bread; the tomato, the carrot, the turnip, the squash, the egg-plant, and a host of others all help to supply us with food, while apples, peaches, pears, grapes, and other delicious fruits are held out to us by many trees, bushes, and vines.

2. If we wish to build a carriage, omnibus, cart, wagon, car, or railroad, the oak, the ash, the

maple, the chestnut, the pine, and other trees supply us with materials for them all.

3. If we wish to go across the ocean, the trees supply us with materials for ships.

4. If we go as far as the island of **Ceylon**, one tree there, called the bread-fruit tree, will supply us with bread, which hangs in small loaves from the branches. All you have to do is to take it and bake it and eat it.

5. If you go to **China** or **Japan,** you will find the tea-plant, that gives us a pleasant drink, and you will find there also about twenty different kinds of rice. Besides these is a tallow-tree, that supplies materials for candles.

6. The tallow of which our candles are made is the suet or fat of such animals as the ox and sheep.

7. If you should sail to **Brazil, Arabia, Abyssinia,** or other warm countries, or to the Island of **Java,** you would see fields covered with evergreen plants bearing small berries which furnish a part of the breakfast for many millions of people every day. What is it? *Coffee.*

8. Besides the places mentioned, coffee grows in the **West Indies, Central America, Venezuela, Guiana, Peru, Bolivia, Ceylon,** and some of the islands in the Pacific Ocean.

9. Although the coffee-plant attains the height of 8 to 20 feet, it is usually kept pruned to 5 feet in height. The plants are raised from seed and transplanted. They are in

full bearing in the fifth year and continue to bear for about twenty years.

Branch of a Coffee-Plant.

10. Coffee is named from a region south of **Abyssinia,** named Kaffa.

11. The best coffee is the Mocha, named from a place in **Arabia,** and the Java. Most of our coffee comes from **Brazil,** and much of it is marked Java.

12. **Maracaybo** (*Mah-ra-ki'-bo*), which has given its name to one variety of coffee, is in **Venezuela.**

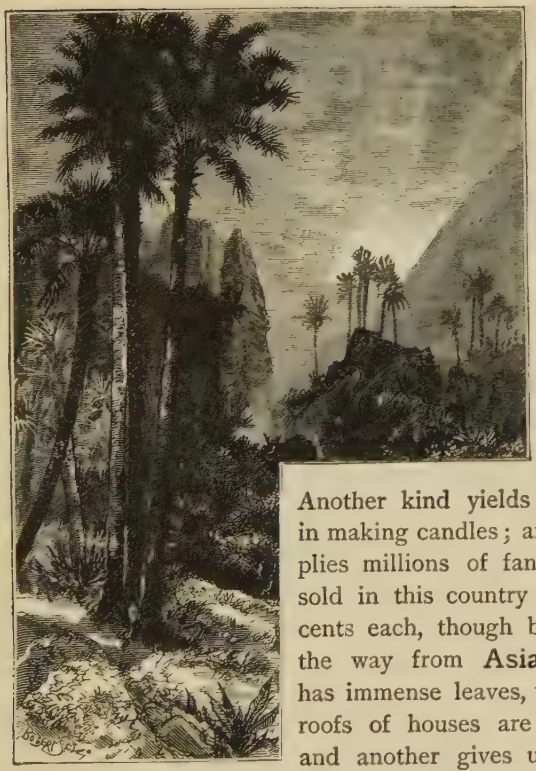
13. In **Africa** and **Asia** are many kinds of palm. These supply cocoanuts, palm-sugar, palm-wine, and palm-oil. The latter is used in this country to make soap, and perhaps some of you have washed your hands with this very palm-soap.

14. Some of you, perhaps, have eaten sago in pudding. Sago comes from a kind of palm, and a very wonderful tree it is.

15. A man can live for a year upon one of these trees. It seems rather funny for a man to eat up a tree, but so it is.

16. Its preparation consists in cutting off the branches and also the hard outside part of the trunk. The whole interior of the tree is composed of a highly nutritious substance held together by fibers. This is roughly grated or pounded into a pulp, which is made into flat cakes and baked.

17. One sago-tree supplies cakes enough to feed one man for a whole year.



Palm-Trees.

18. The cocoanut-palm not only gives us fruit, but it also yields a kind of oil from which a soap is made that can be used with salt water. Another kind yields wax, used in making candles; another supplies millions of fans that are sold in this country for a few cents each, though brought all the way from **Asia**; another has immense leaves, with which roofs of houses are thatched; and another gives us its leaf-stalks to make coarse brooms.

19. The cocoanut-palm grows only in warm countries, and on the islands of the **Indian Ocean** and the tropical parts of the **Pacific Ocean**.

20. It grows to the height of about one hundred feet, lives about one hundred years, and bears about one hundred cocoanuts every year.

21. Its leaves, which are only at the top of the trees, are about twenty feet in length.

Leaves: Palm. Sugar-Maple. Chestnut. Oak.

Draw on blackboard the palm-leaf 2 feet long (one-tenth the full length), the maple 5 inches, and each of the others 7 inches (full length).

If the teacher direct, other leaves may be brought to school by the pupils, who will call the names of the leaves.

22. Another palm that grows in **Egypt** gives us a kind of gingerbread all ready for us to eat. It is called the Doum palm.

23. Some trees in **South America** and **Africa** are called cow-trees, because they give a kind of milk.

24. Besides the trees that furnish bread and milk, there are others that yield a substance like butter. Of these the African tree seems the best, for the butter from it is sweet, white, and firm, and will keep for a year without salting.

25. Besides bread, milk, and butter, plants yield also sugar. This we have from the sugar-cane, from the maple-tree, and from the beet-root. Enough is made from this latter in **France** to supply that whole country. It is just as clear and sweet as the best loaf-sugar manufactured from the sugar-cane. From the

sorghum we get a sweet syrup, and from potatoes and other vegetables a sweet liquid called glucose is obtained, which is sometimes used to adulterate sugars and syrups.

Sugar-Cane.

26. Sugar-cane is raised from cuttings planted every two or three years. It was first cultivated in **Asia**, then in **Spain** in the ninth century. Soon after the discovery of America it was introduced into **Mexico**, the **West Indies**, and **Brazil**.

27. Now it is cultivated in **Louisiana, Texas, Florida**, and the other States which border on the **Gulf of Mexico**; in **Brazil, Guiana, Venezuela, Bolivia**, the **West Indies, Mexico**, and **Central America**; in **China, Japan**, and **Farther India**; in **Egypt, Liberia**, and **Zanguebar**; and in the **Sandwich Islands, Society Islands**, and other islands which have a warm climate.

28. When the sugar-cane is cut it is taken to the mill, where it is crushed between large rollers. The juice is then heated in large pans or boilers; then it is transferred into coolers, and the molasses is drained off from the sugar, which is of a dark brown color. After this the sugar goes through a process called refining, which produces loaf and refined sugars and syrup.

29. Maple sugar and syrup are obtained by first boiling and then cooling the sap of the sugar-maple tree. A hole is bored into the tree and a tube is inserted, through which the sap trickles out and falls into a pail or other vessel.

30. The plants that poison us are very curious. Some men are dreadfully poisoned if they merely pass near some of them. Other men can handle these same plants without being at all affected by them. There is one tree in the **West Indies** from which, if the rain drips upon a man's skin, huge blotches are raised up immediately. Some of these poison plants kill us quietly, sending numbness all through our bodies, and others kill us with terrible convulsions.

31. There is one very curious plant that poisons us or nourishes us, according to the part we take. It is called the manioc, or cassava. It grows usually to the height of six or eight feet. Its roots are very large, sometimes weighing thirty pounds, and growing from three to eight in a cluster, usually from a foot to two feet long.

Like the other parts of the plant, these contain an acrid, milky juice, so poisonous as to cause death in a few minutes; but, as this is owing to the presence of a poisonous acid which is quickly driven out by heat, the juice, thickened by boiling, forms an excellent sauce called cassa-reep.

32. This is highly esteemed in **Guiana**, where it is used to flavor almost every dish, and it is even imported into **Great Britain.**

33. The root, grated or pounded into pulp, after yielding this deadly juice by pressure, is dried, and forms the well-known cassava-bread; or else, heated and stirred on metal plates, it forms the well-known tapioca, which is sold in our stores, and served up in our restaurants and in our families as tapioca pudding, which perhaps some in this class have eaten. Thus life or death comes to us from this plant, according to our knowing how to use it.

34. In the size of plants there is wonderful variety. There are some plants so small that we only know of their existence by their changing the color of the rocks and stones on which they grow. To see their stems and leavés it is necessary to use the microscope.

35. From these small specimens, plants vary in size up to the giant trees of **California,** that stand 90 or 100 feet in girth and tower up to the height of 300 or 400 feet.

36. The trunk of one of these trees when lying on the ground is thirty feet high, which is as high as an ordinary two-story house.

37. One man had the stump of one of these trees smoothed off and built a house on it. One of these huge trees became rotten at the heart and was blown down in a storm. The center was cut away so that a horse and wagon could be driven through it. They are called the Redwood trees.

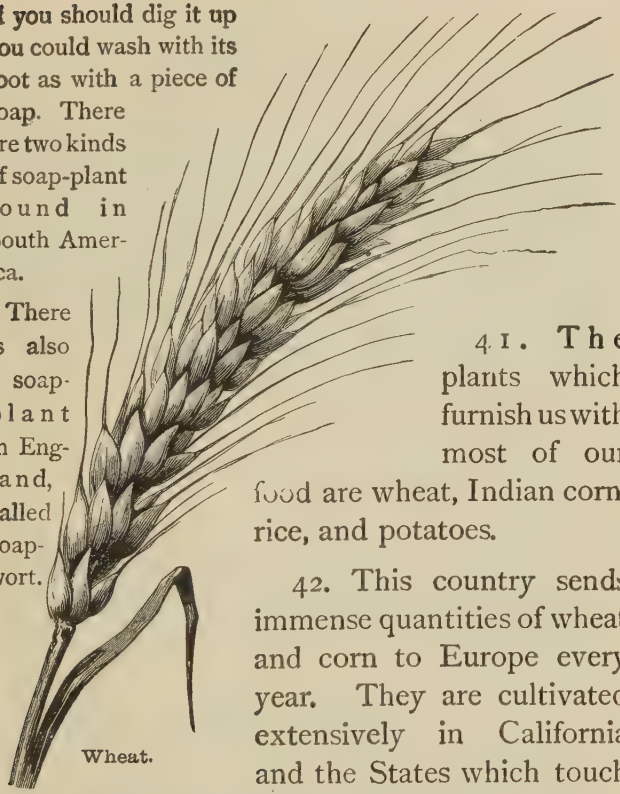
38. The bark of some trees is used to cover houses; that of the cork-trees of **Portugal** and **Spain** gives us all our corks; a certain tree from **Peru** gives us, in its bark, the fever-curing medicines called quinine and cinchona. The slippery elm gives also a medicinal bark. Cassia and cinnamon are the bark of certain kinds of laurel that grow in the **East Indies.** The oak, the hemlock, and other trees enable us, by means of their bark, to make leather out of hides by a process called tanning. Boats also are made of bark; chiefly birch and spruce.

39. There are some plants that seem offended if you touch them, and close up their leaves immediately. These are called sensitive plants. The best one comes from **Brazil.** There is a plant of this kind in our Southern States, but it is not so sensitive.

40. There are also plants that give us soap besides the palm-soap which we have already mentioned. As you are walking along in **California** you will sometimes see what looks like an old paint-brush sticking up out of the ground.

If you should dig it up you could wash with its root as with a piece of soap. There are two kinds of soap-plant found in South America.

There is also a soap-plant in England, called soap-wort.



Wheat.

41. The plants which furnish us with most of our food are wheat, Indian corn, rice, and potatoes.

42. This country sends immense quantities of wheat and corn to Europe every year. They are cultivated extensively in California and the States which touch the **Great Lakes** and the **Missouri River.**

43. The States which are celebrated for wheat and corn are **California, Illinois, Indiana, Ohio, Pennsylvania, New York, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, and Nebraska.**

44. Countries besides ours which are cele-

Cultivation of Rice.

brated for wheat are **Russia, France,** and **Austria.**

45. Rice is used for food more than any other grain. Millions of the inhabitants of **Asia** make it their chief article of agriculture and food.

46. The excellent rice for which **South Carolina** is celebrated is due to a few seeds left there by a vessel from **Madagascar** over two hundred years ago.

47. Rice grows also in other warm countries. A wild kind of rice grows in the swamps and lakes of **Minnesota.**

48. Indian corn is, next to rice, the most used. It originated in America long before the discovery by Columbus.

49. The potato is the most useful and the most extensively cultivated of all vegetables. It

is a native of **South America** and it still grows wild in **Peru** and **Chili**; it was first taken to Spain and England about three hundred years ago.

50. Potatoes are more extensively cultivated in New York than in any other state; they are largely used in the manufacture of starch.

51. There is another plant which is also very extensively used in all parts of the world, and which, like the potato, was first found and cultivated by the natives in America, before the discovery of America; it is tobacco. Tobacco grows best in warm countries; the ancient Mexicans raised large crops of it.

Tobacco.

52. Now it is extensively cultivated in **Kentucky, Virginia, Pennsylvania, Ohio, Tennessee, N. Carolina,** and **Maryland**; also in **Cuba, China, Japan, Persia,** and Southern Europe.

53. Chocolate is prepared from the seeds of the chocolate or cacao tree, which grows abundantly in **Central** and **South America** and the **West Indies.**

54. Cacao is pronounced ka-kay'o or kay'ko. The cocoa (ko'ko) or cocoanut-tree is entirely different (p. 159).

The Preparation of Tea.

55. Tea consists of the leaves of the tea-plant, dried first in the sun, then in heated pans, and rolled. The color depends chiefly upon the age of the leaves when plucked, and upon their preparation. Materials for coloring the leaves are often used.

Branch of a Tea-plant.

56. The plant, which is kept pruned down to the height of about five feet, grows abundantly in **China** and **Japan.**

57. It is cultivated to some extent in the mild climates of California and the Gulf States.

58. The plants or shrubs are raised from seed, and are picked from the third to the tenth year.

59. Grapes flourish in countries which have warm or moderately warm climates.

A Vineyard—Gathering Grapes.

60. The central and southern parts of **France** and **Germany**, and nearly all parts of **Spain, Portugal,** and **Italy**, are especially noted for their extensive vineyards, and for the great quantities of wine made from the grapes.

61. The vines are mostly kept trimmed down, and not allowed to grow as high as a man's head.

62. Wines have received their names from the places where they are made or shipped from, or where the grapes are cultivated; as, Champagne and Burgundy wines, from ancient provinces in **France**; Rhine wines, from the river **Rhine**; port wine, from the city of **Oporto** (in Portu-

gal), whence it is shipped; Bordeaux wine (*bor-do'*), from **Bordeaux**, the great wine port of France; Madeira wine, from the **Madeira Islands**, northwest of Africa; Sherry wine, from Jerez, a town in the south of **Spain**; California wines, from the State of **California.**

Taking Grapes to the Wine-press.

63. In the vintage season, or when the grapes are ripe, men, women, and children go into the vineyards and pluck off the bunches, filling their boxes or baskets, which are emptied into huge tubs. When these are full, they are hauled in carts by oxen to the press-house, where the

juice is pressed out and left to ferment, thus producing wine.

64. Vineyards cover about 700,000 acres of land in France, and the value of the wine produced there sometimes exceeds that of the whole cotton crop of the United States, which is about $200,000,000 annually.

65. Considerable wine is manufactured in the States of California, Ohio, New York, and Missouri.

66. Wine is made also from currants and berries.

67. New vines are raised from cuttings of the previous year's wood.

68. Brandy is made from wine by distilling it, which is done by evaporation and condensation. (See page 22.)

69. Grapes contain considerable sugar (about a fourth is sugar), which, when fermented, produces alcohol.

70. From **Spain** we get our raisins, which are grapes dried and prepared; and you will be surprised to hear that the currants which you have eaten in cakes and puddings are not the fruit of what we call currant bushes, but really a very small kind of grape which grows in Greece, and is prepared there for shipment to the United States and other countries.

71. Besides grapes, the countries of Southern Europe raise grain and vegetables in abundance; even between the rows of vines you may see wheat, or corn, or beet, or other plants growing. There are also great orchards or groves of mulberry trees, which feed the silk-

worm; of olive trees, from the fruit of which olive or sweet oil is made; and of orange and lemon trees.

72. Orange trees require a warm climate. They are killed by severe frost. In the United States they are cultivated in **Florida, Louisiana, Texas,** and in the southern part of **California.**

73. Most of the oranges sold in the United States are from the countries bordering on the **Mediterranean Sea,** and from the **West Indies.**

74. In cooler countries, apple trees grow abundantly. Introduced into America by the early settlers of New England, the apple is more extensively used in this country than any other fruit. Large quantities are sent to the cider-mill, pressed between rollers, and their juice converted into cider.

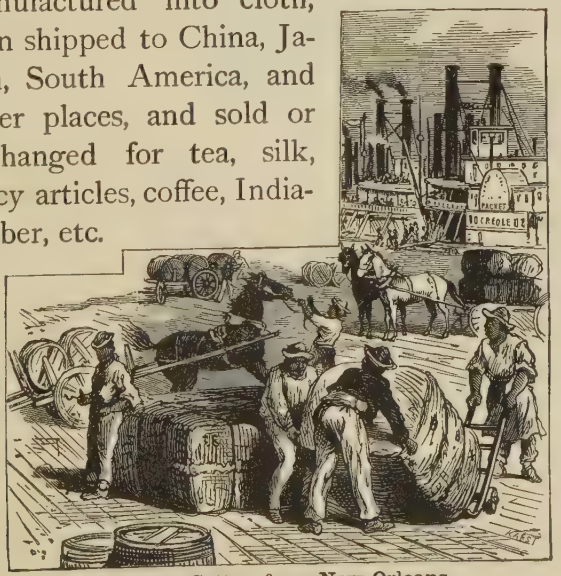
75. Of all the plants, one of the most useful and valuable is cotton. It grows only in temperate and warm climates, especially in our Southern States. Mississippi, and the other States which border on the Gulf of Mexico, yield the most.

76. It grows from seeds, and bears a pod or boll, which bursts open in the autumn from the

pressure of the soft, white, downy substance within, called cotton. This is picked out of the bŏll, and carried to a cotton-gin (*jin*), by which it is separated from the seeds. It is then pressed and packed in bales, and sent to the cotton mills to be spun into thread, then woven into muslin, calico, etc.

77. Large quantities are sent to the cotton mills of Massachusetts, New Hampshire, Rhode Island, and other States.

78. About one-half of the annual crop is sent to Europe, principally to England, where it is manufactured into cloth, then shipped to China, Japan, South America, and other places, and sold or exchanged for tea, silk, fancy articles, coffee, India-rubber, etc.



Shipping Cotton from New Orleans.

Picking Cotton.--A Cotton Press.

79. Now, however, the American manufacturers are gaining a market for their goods in each of those places.

80. The Southern States produce about 5,000,000 bales of cotton every year. Here the seeds are planted every year, in the spring.

81. Cotton is cultivated also in Egypt, India, China, the West Indies, and South America. Here it grows also on shrubs and trees.

A Cotton Boll.

82. The first cotton mill in the United States was built in **Rhode Island.**

83. The city which sends away the greatest quantities of cotton every year is **New Orleans,** and that which receives the most is **Liverpool.**

Flax.

84. Besides cotton, there is another plant which is very useful in furnishing us with material for clothing. What is that? *Flax, from which linen is made.*

85. Linen is a kind of cloth made from a material obtained from the plant called flax. This grows to the height of two or three feet. It has slender stalks, which are covered with a bark or skin containing fibers or a thread-like substance. Flax grows from seed sown in the spring; it is pulled out by the roots in summer, and after drying, soaking, scutching or beating, and other processes, the fibers are separated from the other portions of the bark, spun into thread, and woven into cloth called linen, cambric, lawn, tablecloths, towels, etc.

86. The seeds of the flax are called linseed. Like those of the cotton plant, they yield a useful oil and a substance which is made into food for cattle.

87. Linen was known to the ancient Egyptians many hundred years ago, who exported it to Greece and Rome.

88. Ireland is celebrated for its fine linen.

89. The cultivation of flax and the manufacture of linen are carried on extensively, also, in Great Britain, Germany, Holland, France, Belgium, Russia, and several States of the Union.

90. The city of **Belfast**, in Ireland, manufactures more linen goods than any other city in the world.

91. You have learned something about the two plants which are celebrated for furnishing materials for clothing—cotton and linen. There is another plant, or rather a large tree, which yields a very useful substance; not fruit, nor its seeds, nor its bark, nor its roots, but its sap. In that respect it resembles the sugar maple tree, but we cannot eat any part of the tree. We wear articles made from it, yet it cannot be spun or woven like cotton or linen. Do you know what tree it is? *The India-rubber tree.*

92. India-rubber, or Caoutchouc (pronounced koo-chook′), is the milky sap of that tree. Cuts or gashes are made in the bark, into which cups are inserted for collecting the sap. This is afterwards hardened by heat, the smoke giving it a dark color. It is further hardened by sulphur.

93. Boots, shoes, car-springs, and a great variety of articles are made of it in **Connecticut, Massachusetts, New York**, and **New Jersey**.

94. The India-rubber brought to the United States is mostly from **Brazil** and **Central America**.

95. There is another tree which is valuable for its sap, called turpentine. This is obtained in a similar manner; when distilled (p. 171), it yields rosin or resin and the oil or spirits of turpentine, both of which are used in the manufacture of varnish, and for other purposes. What is the name of the tree, and where does it grow? *The pine, which grows extensively in the sandy soil of* **North Carolina** *and the neighboring States. It grows also in other parts of North America and in Europe.*

96. Some of these trees are cut down and their roots and branches piled up, covered with turf or earth, and set on fire, to make charcoal and tar; the latter is the sap, which runs into a large iron vessel underneath the pile, and is conducted by pipes into casks near by. This constitutes an important occupation in **North Carolina, Canada,** and **Sweden.**

97. Pitch, which is very useful in ship-building, is made from tar.

98. What is ivory? *A hard, white substance which forms the tusks of the elephant.* There is a kind of tree growing along some of the streams in the northern part of South America which is called the vegetable-ivory tree; its seeds or nuts contain a juice which hardens into a substance resembling ivory.

99. Those trees which yield wood used chiefly in the manufacture of pianos, boxes, furniture, etc., are the mahogany and rosewood, which come from **Brazil, Central America,** and the **West Indies.** Some of these trees are sawed into layers about one-eighth of an inch in thickness, called veneer, which is used to cover over cheaper woods.

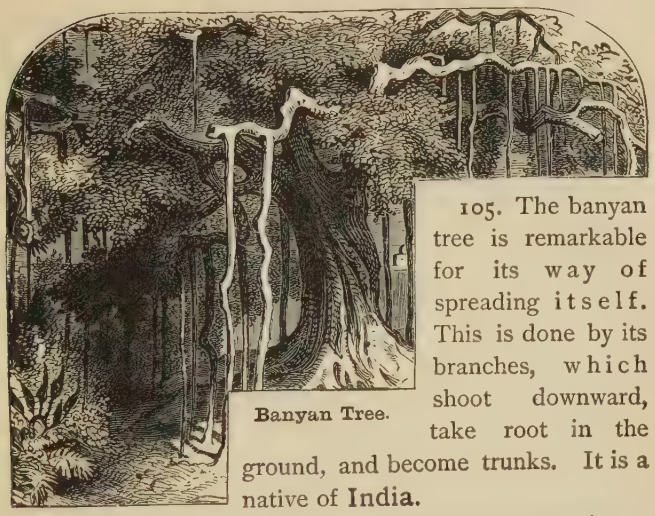
100. Several thousand dollars have been paid for the logs from a single tree. The forests on the coast of **Honduras** supply large quantities of mahogany; but the best sorts, called Spanish mahogany, are found in **Cuba** and **St. Domingo.**

101. The first use known to have been made of mahogany was about 300 years ago, by Sir Walter Raleigh, who repaired his ships with it, at **Trinidad,** an island off the coast of **Venezuela.**

102. Box-wood is a hard, smooth wood used by wood-engravers; it comes from countries bordering the eastern part of the **Mediterranean Sea.**

103. Ebony is a hard, black wood, used for inlaid and other ornamental work; the tree grows in **Madagascar** and **Ceylon.**

104. The date-palm grows abundantly in **Persia, Arabia, Asia Minor, Egypt, Tunis, Algeria, Morocco,** and in the oases of **Sahara,** or the Great Desert. Its fruit forms the chief article of food in many parts of these countries. An oasis is a fertile spot in a desert.



Banyan Tree.

105. The banyan tree is remarkable for its way of spreading itself. This is done by its branches, which shoot downward, take root in the ground, and become trunks. It is a native of **India.**

106. The trees which yield cloves, nutmegs, mace, ginger, cinnamon, and black pepper, grow in **Java, Sumatra, Ceylon,** the **Spice** and other islands south and southeast of Asia; some of them grow on the mainland also.

107. Figs, olives, pomegranates, and almonds grow abundantly in the countries which surround the Mediterranean Sea. The dried figs used in the United States come mostly from **Turkey.** The olive tree, whose leaves are small and of a light green color, yields fruit from which olive oil is obtained.

108. Bananas, pineapples, guava, and tamarinds, as well as oranges and lemons, abound in the **West Indies.**

109. Prunes are plums raised and prepared in France.

110. Cranberries grow on a little running shrub, in low, flat, sandy districts, which may, like rice-fields, be flooded; covering for a while the whole surface with water, and

making the meadows appear like ponds. They are extensively cultivated in the eastern part of **New Jersey.**

111. We have before mentioned certain plants the use of which is injurious to health. There are others. In **India,** along the **Ganges** River, thousands and thousands of acres of land are devoted to the cultivation of a plant, on account of the juice or sap taken from its seed-vessels; the plant is called the white poppy. The juice is called opium, and it is extensively used by the Chinese, who both smoke it and eat it for the peculiar, dreamy, and quieting, or rather deadening, effect which it produces on the feelings. Its use is very injurious to both body and mind.

112. From opium, the drugs called laudanum and mor'phia or mor'phine are derived. These are often prescribed by physicians to allay pain or to produce sleep. The opium used in the United States and in Europe is mostly imported from **Turkey in Asia** and **Persia.**

113. There is another plant which yields a substance called hasheesh or hashish; this also produces stupor and dreaminess, and is extensively used in Asiatic countries. The plant is hemp, from the fibres of which, rope, bagging, etc., are made; it is raised chiefly in **Russia.**

114. Camphor is a substance obtained from the wood and bark of the camphor trees of **China, Japan, Formosa, Sumatra,** and **Borneo.**

115. Rhubarb is the root of a plant which grows in Central Asia, whence it is sent to **Turkey** and **Russia,** and then exported.

116. Castor oil is obtained from the seeds of the castor-oil plant, which grows in Africa, America, and Europe.

117. All of you have seen an apple tree, and know the various forms of food into which its fruit can be made; but do you know where and how the tree gets the food which it lives upon? Let us talk about this.

118. The substances which supply it with its food or nourishment are in the ground and the air.

119. The principal substances are called carbon, hydrogen, and oxygen.

120. Many thousands of little mouths in the roots are ever on the alert for these substances, which go to make wood, leaves, and fruit; taking them in with the water in the soil, and sending sap upward to every branch, twig, and leaf.

121. The leaves, too, are at work all day long, breathing in through their countless pores, or mouths, moisture from the atmosphere, and, with the aid of sunlight, changing and preparing the sap. Then the sap returns toward the roots, supplying on its way what is needed for every part of the tree.

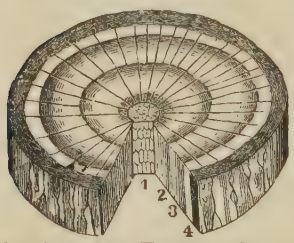
122. The roots, trunk, and branches, contain multitudes of little tubes or pipes, through which the sap flows; one set for the rising sap, and another set for the returning sap. The sap

is to a tree what blood is to an animal, and both the sap and blood are always in circulation.

123. Leaves not only inhale (breathe in) moisture, but they also exhale (breathe out) it. Some of the water which has brought up the nourishment to the leaves, being no longer required, is thus exhaled or evaporated through the pores of the leaves.

124. Does the apple tree enlarge on the inside, or outside; by the rising, or the returning sap? *The increase is on the outside of the hard wood, or just along the inner bark, and is supplied by the returning sap.*

125. Every year a layer is added; therefore, when such a tree is sawed across the trunk, the layers will appear like rings and show the age of the tree.



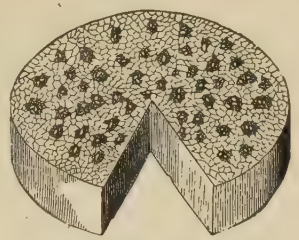
Section of an Exogen of two years' growth.

126. In counting the rings, the pith (1) and the bark (4), belonging to the first year's growth, are not to be included.

127. Trees which thus grow by additions to the outside of the hard wood, or externally, are called exogens (*ex'-o-jens*); such include apple, pear, maple, elm, and many other kinds of trees.

128. Trees and plants which increase by internal growth, showing no layers or rings like those

above named, are called *en'-do-gens*, such as palm-trees, Indian corn, sugar-cane, wheat, grasses, etc.



Section of an Endogen.

129. The newest wood of exogens is just under the bark, while that of endogens is in the center.

130. Endogenous trees and plants just described should not be mistaken for indigenous (*in-dij'-e-nus*), which means those which are native of a certain country or climate.

Exogen.

Endogen.

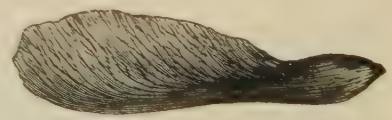
131. Trees and plants are multiplied in various ways: by seeds, as acorns, grain and cotton-seed; by cuttings, as the grape-vine, sugar-cane, and

geraniums; by dividing or separating roots, tubers, and bulbs, as the strawberry, potato, dahlia, and hyacinth; and by grafting.

132. Grafting is the insertion of a cutting or bud of one plant into a branch or stem of another. This is often done with rose and fruit trees.

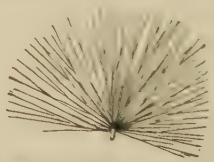
Fern, with Spores.

133. Vegetation is extended over the land not only by men, but also by the winds, streams, ocean-currents, birds, bees, etc.



Seed of a Maple Tree, Full Size.

134. Many seeds are provided with a kind of wing or some light substance, and are scat-



Seed of the Thistle.

tered far and wide by the winds, as those of the ash, elm, and maple trees, the thistle and the dandelion.

135. Plants are divided into two general classes, flowering and flowerless. Flowering plants and trees produce seeds, each containing an embryo or undeveloped plant. Flowerless plants, such as ferns, have spores instead of seeds. These appear like brown dust or spots on the leaves. Try to bring a fern leaf with spores on it to your teacher.

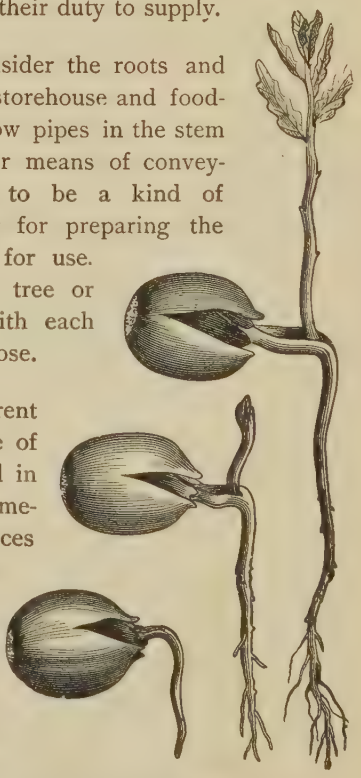
How a Maple Tree begins to grow.

136. The origin or beginning of a plant is a seed, which is a wonderful combination of all the parts of that plant.

137. Placed in the ground, the seed sends down its roots to find food or nourishment and also to hold the plant firmly in its place. Then the stem appears above ground. When the plant is grown and perfect, it consists of these five parts: root, stem or trunk, leaves, flowers, and fruit. You may bring some specimens of seeds, and be prepared to mention the name of the tree or plant to which each belongs.

138. At the end of every little root is a kind of mouth; and, as different kinds of plants require different kinds of nourishment, these little roots, which appear like bunches of threads, keep spreading themselves in the ground in search of the particular substances just suited to the plant which it is their duty to supply.

139. So you may consider the roots and their mouths to be the storehouse and food-gatherers; the long, narrow pipes in the stem or trunk, the channels or means of conveyance; and the leaves to be a kind of stomach or manufactory for preparing the food and making it fit for use. That is, all parts of a tree or plant act in harmony with each other for some good purpose.



How an Oak begins to grow.

140. There are different kinds of roots: 1st, those of forest trees, which extend in various directions and sometimes to greater distances than the trunk and its branches; 2d, those which appear like a bunch of threads or fibers, and which are called fibrous, as those of the hyacinth and grasses, 3d, those associated with tubers, like the potato, and which are called fleshy roots; 4th, those which taper downward and send out fibers from their sides, like the carrot and parsnip.

141. Roots are divided also into different kinds, according to their length of life; into annual, or those which live but one year; bi-en'ni-al, those which live but two years; and per-en'ni-al, those which live several years.

142. To which of these divisions does a morning-glory belong? A rose bush? A pear tree? A currant bush? A fern? Beets? A cotton plant? Grasses? Indian corn? Carrots? Butter-cups?

Some trees, like the oak, cedar, pine and olive, live for centuries.

Hyacinth.

143. Trees differ also in their stems or trunks; some grow up for a short distance from the ground and then branch out in every direction, like the apple tree; while others grow up almost in a straight line, ten times as high as any apple tree; such are the mammoth trees of California, the eucalyptus* trees of Australia, and the cocoanut trees of Africa and Asia.

How Corn grows.

The trees just named are remarkable for the great distance between the ground and their lower branches. The cocoanut and other palms have all their leaves at the top.

* [u-ka-lip'tus,]

144. Trees which lose their leaves in autumn are called de-cid'u-ous, which means *falling off.* Those which retain their leaves through the winter, or until new leaves appear, are called evergreen. An apple tree is deciduous, and a hemlock is evergreen.

145. Leaves differ from each other very greatly in their size, shape, color, and construction; some have smooth edges, while others have saw-like edges; some are long and narrow, like those of Indian corn and the sugar cane, while others are broad and round, like the cabbage and begonia. Leaves differ from each other also in regard to the number and arrangement of their veins.

Leaf Veins. **Veinlets.** **Veinulets.**

146. VEINS.—The first leaf above shows its stem or foot-stalk, called its pet'-i-ole (*P*), from which, at the base of the leaf, spring its veins, five in number.

147. VEINLETS. — The next shows small branches from the veins, called veinlets.

148. At the end of some words, *let* signifies *small;* as leaf*let*, a small leaf; is*let*, a small island; stream*let*, a small stream; root*let*, a small root; and vein*let*, a small vein.

149. VEINULETS, NET-VEINED.—The third shows finer branches from the veinlets, called veinulets. Such a leaf is said to be net-veined. With few exceptions, the leaves of exogens are net-veined.

Mid-Veined. Parallel-Veined. Fork-Veined. Serrated.

150. MID-VEINED.—Leaves having but one large vein, which is the continuation of the petiole (*P*), and runs from the base (*b*) of the leaf to the apex (*a*) through the middle, are called mid-veined.

151. PARALLEL-VEINED.—The veinlets which branch from the mid-vein are parallel with each other; the leaves are therefore said to be

parallel-veined. The leaves of most endogens are parallel-veined, as those of corn and lilies.

152. FORK-VEINED. — Leaves whose veins divide and resemble forks are called fork-veined.

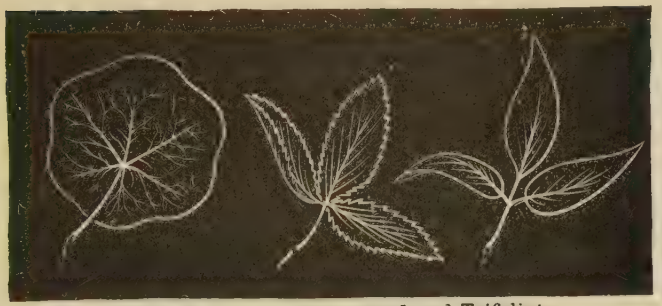
153. SERRATE. — Leaves having a saw-like edge, the teeth pointing forwards, are called serrated. *Serra* means *saw.*

154. A FEATHER-VEINED leaf is one in which its veinlets branch off from the mid-vein, thus resembling a feather.

Hand-Shaped. **Finger-Shaped.** **Gashed.**

155. A HAND-SHAPED leaf is so called from its resemblance to the palm of the hand and fingers.

156. A FINGER-SHAPED leaf is one whose parts or divisions, called lobes, are more separated from each other than those of the hand-shaped leaf, and appear like fingers without the palm of the hand. When the leaf appears as if cut with scissors, it is said to be GASHED.



Shield-Formed. Compound and Trifoliate.

157. A SHIELD-FORMED leaf is one which has its veins radiating from the petiole at or near the center of the leaf instead of its base.

158. SIMPLE LEAVES.—The twelve leaves just described are called simple leaves, because only one leaf is attached to each petiole.

159. The GASHED LEAF is but one leaf, cut or divided, and is therefore a simple leaf; such also are the finger-shaped and hand-shaped leaves.

160. COMPOUND LEAVES—TRIFOLIATE.—When a petiole bears two or more distinct pieces or blades, the blades are called leaflets, and the group is called a compound leaf. Three leaflets together, or near together, on the same petiole, are called tri-fo'-li-ate (*tri*, three), as the clover.

161. [The pupils may collect from the woods or gardens as many of these varieties of leaves as they can; then classify them and name their different parts; or describe each leaf as the teacher holds it up; or attach one or more leaves to a piece of paper, write a short description of each, similar to that on the following page, and hand it to the teacher.]

[MODEL.]

This leaf is compound; it is also finger-shaped. It is composed of seven leaflets. Each leaflet is mid-veined, parallel-veined, feather-veined, and serrated. It is a leaf from a horse-chestnut tree.

162. Besides this, the pupils may write about any tree or plant, as a lesson in spelling and composition.

163. Seeds differ very greatly from each other. Some are inside of the fruit, like those of the apple; some are on the outside, like those of the strawberry; others are together, forming the fruit, like those of the blackberry.

164. Some seeds furnish us with flour, from which our bread is made, as wheat; or with

Violet Seed in Capsule.

Wild Strawberry and Seed.

Acorns (Seeds of the Oak).

Cone of Hemlock Tree.

Peas in Pod.

Cone of Pine Tree.

meal, as Indian corn; while many others are not used for food in any form.

165. Some seeds are enclosed in a pod capsule, or case, like those of peas, pansies, violets, and lady-slippers; while others consist of a kernel and hard shell, like the hickory nut

Strawberry Plants are multiplied, also, by means of their runners, which readily take root and which are then cut or separated from the parent plant.

Picking Blackberries.

166. When rambling in the woods, you should examine some of the various plants, roots, leaves, flowers, fruits and seeds which you see. You will thus be easily led to the study of that delightful science called *BOTANY*, to which your attention has been directed in this chapter.

Gathering Wild Flowers and Studying Botany.

II. Written Review of Trees and Plants.

To be written on slates or papers, either at home or in school, as the teacher may direct. Write, in the form shown below, the names of the principal trees and plants from any part of which, food, drink, clothing, etc., may be obtained, prepared, or manufactured.

Food.

NAMES OF TREES AND PLANTS.	WHERE PRODUCED OR CULTIVATED.
1.....	1.....
2.....	2.....
3.....	3.....
4.....	4.....
5.....	5.....
6.....	6.....

Drink.

1.....	1.....
2.....	2.....
3.....	3.....
4.....	4.....
5.....	5.....
6.....	6.....

Clothing.

1.....	1.....
2.....	2.....

Also, those from which are obtained

Sugar, Useful Bark, Useful Sap, Oil, Medicine, Fruit, Poison, Building and Ornamental Wood.

III. THE CORN SONG.

HEAP high the farmer's wintry hoard!
Heap high the golden corn!
No richer gift has autumn poured
From out her lav'ish horn!

Through vales of grass and meads of flowers,
Our ploughs their furrows made,
While on the hills the sun and showers
Of changeful April played.

We dropped the seed o'er hill and plain,
Beneath the sun of May,
And frightened from our sprouting grain
The robber crows away.

All through the long, bright days of June
Its leaves grew green and fair,
And waved in hot midsummer's noon
Its soft and yellow hair.

And now, with autumn's moonlit eves,
  Its harvest time has come,
We pluck away the frosted leaves,
  And bear the treasure home.

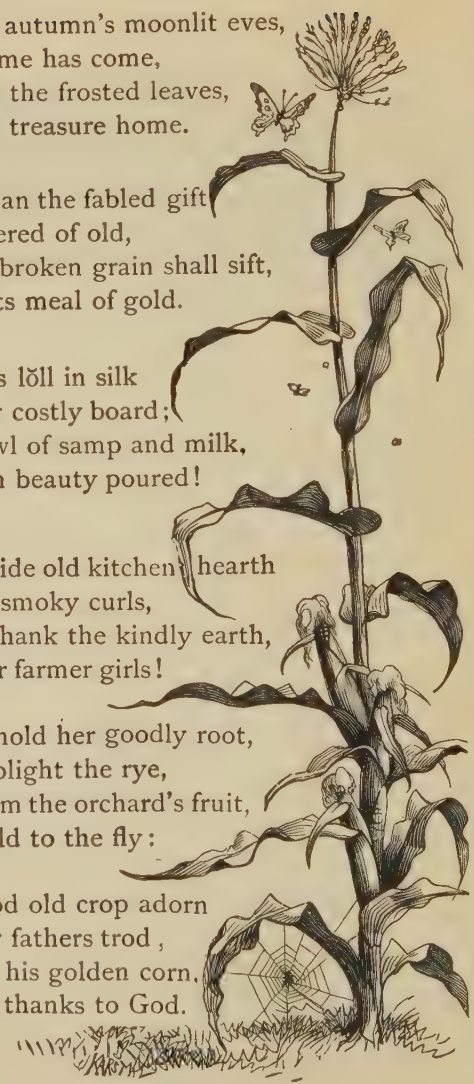
There, richer than the fabled gift
  Apollo showered of old,
Fair hands the broken grain shall sift,
  And knead its meal of gold.

Let vapid idlers lŏll in silk
  Around their costly board;
Give us the bowl of samp and milk,
  By homespun beauty poured!

Where'er the wide old kitchen hearth
  Sends up its smoky curls,
Who will not thank the kindly earth,
  And bless our farmer girls!

Let earth withhold her goodly root,
  Let mildew blight the rye,
Give to the worm the orchard's fruit,
  The wheatfield to the fly:

But let the good old crop adorn
  The hills our fathers trod,
Still let us, for his golden corn,
  Send up our thanks to God.



IV. THE VIOLET'S COMPLAINT

"I WONDER what I was created for—I am so weak and small," thought a violet, as it shook off a dew-drop which weighed it to the ground. "Surrounded by these leaves which shut me in from the world, bowed down under the weight of the morning dews, I must spend a worthless existence, unknown and uncared for."

2. "How I envy yonder oak! how proudly it stands! what cares it for the winds, or storm. Its branches laugh and wrestle in the breezes that cause me to bow my head in fear. Even the cattle love its cooling shade, and there they rest from the burning sun. It has its work to do, while I—but hark! I heard the sound of thunder, I must hide my head beneath the shelter of these dark green leaves until the storm of wind and rain is past."

3. An hour passed; the storm was over; again the sun looked down upon the earth, refreshed by cooling rain. Lifting its dripping head, the violet gazed in wonder; the oak, unable to bend to the storm, had yielded to a stronger power, and now lay shattered and prone upon the ground.

4. "My weakness has been my safeguard," murmured the violet, in a subdued, shamed tone.

5. Just then a voice exclaimed: "Dear little violet, just what I have been looking for;" and a hand reached down and plucked it from its home among the leaves, and carried it tenderly to a sick girl's

home. "See, Emma, I have brought you the first violet of the season; it was the only one that I could find. Here, let me put it into this little vase beside your bed."

6. "How kind you were, Ethel, to find it for me. I love violets so much;" and the thin, pale hand reached out and took the vase, and gazed upon the little flower. "It is so sweet," she said, "it seems to bring new life and hope to me."

7. Once more the violet was heard to murmur: "I was mistaken; I have a work to do. God has not created anything in vain.

N. Y. Observer.

V. RAIN AND THE FLOWERS.

TO the great brown house where the flowerets live,
Came the Rain with its tap, tap, tap!
And whispered: "Violet, Snowdrop, Rose,
Your pretty eyes must now unclose
From your long wintry nap!"
Said the Rain with its tap, tap, tap!

From the doors they peeped with a timid grace,
Just to answer this tap, tap, tap!
Miss Snowdrop curtseyed a sweet "Good-day!'
Then all came nodding their heads so gay,
And they said: "We've had our nap,
Thank you, Rain, for your tap, tap, tap!"

VI. DEATH OF THE FLOWERS.

THE melancholy days are come, the saddest of the year,
Of wailing winds, and naked woods, and meadows brown and sere.
Heaped in the hollows of the grove, the autumn leaves lie dead;
They rustle to the eddying gust, and to the rabbit's tread;
The robin and the wren are flown, and from the shrubs the jay,
And from the wood-top calls the crow through all the gloomy day.

Where are the flowers, the fair young flowers, that lately sprang and stood
In brighter light and softer airs, a beauteous sisterhood?
Alas! they are all in their graves, the gentle race of flowers
Are lying in their lowly beds, with the fair and good of ours.
The rain is falling where they lie, but the cold November rain
Calls not from out the gloomy earth the lovely ones again.

The wind-flower and the violet, they perished long ago,
And the brier-rose and the orchis died amid the summer glow;

But on the hills the golden-rod, and the aster in the wood,
And the yellow sun-flower by the brook in autumn beauty stood,
Till fell the frost from the clear cold heaven, as falls the plague on men,
And the brightness of their smile was gone, from upland, glade, and glen.

And now, when comes the calm, mild day, as still such days will come,
To call the squirrel and the bee from out their winter home;
The south wind searches for the flowers whose fragrance late he bore,
And sighs to find them in the wood and by the stream no more.

And then I think of one who in her youthful beauty died,
The fair meek blossom who grew up and faded by my side.
In the cold moist earth we laid her, when the forest cast the leaf,
And we wept that one so lovely should have a life so brief:
Yet not unmeet it was that one, like that young friend of ours,
So gentle and so beautiful, should perish with the flowers.

WILLIAM CULLEN BRYANT.

VII. IN THE WOODS.

TOWARDS August or September, any man who has once been in the woods will begin to feel stirring within him a restless craving for the forest.

2. To a man who has once tasted of the woods, the instinct to return thither is as strong as that of the salmon to seek the sea. Let us, then, go into the woods. We have arrived at the last house, where Indians and canoes are waiting for us. Old John Williams, the Indian, beaming with smiles, shakes hands, and says: "I am glad to see you back again[1] in the woods of Canada. How have you been, sir? Pretty smart, I hope." "Oh, first-rate, thank you, John; and how did you get through the winter, and how is the farm getting on?" "Pretty well, sir. I killed a fine fat moose last December, that kept me in meat almost all winter; and the farm is getting on splendidly. I was just cutting my oats when I got your telegram, and dropped the scythe right there in the swath,[2] and left."

3. The first day is not pleasant. The canoes have to be carted ten miles to the head of the stream we propose descending and the hay-wagon wants mending, or the oxen have gone astray. Patience and perseverance, however, overcome all these and similar difficulties, and at last we arrive at the margin of a ti'ny stream.

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[1] **Again**, *a-gen'*.

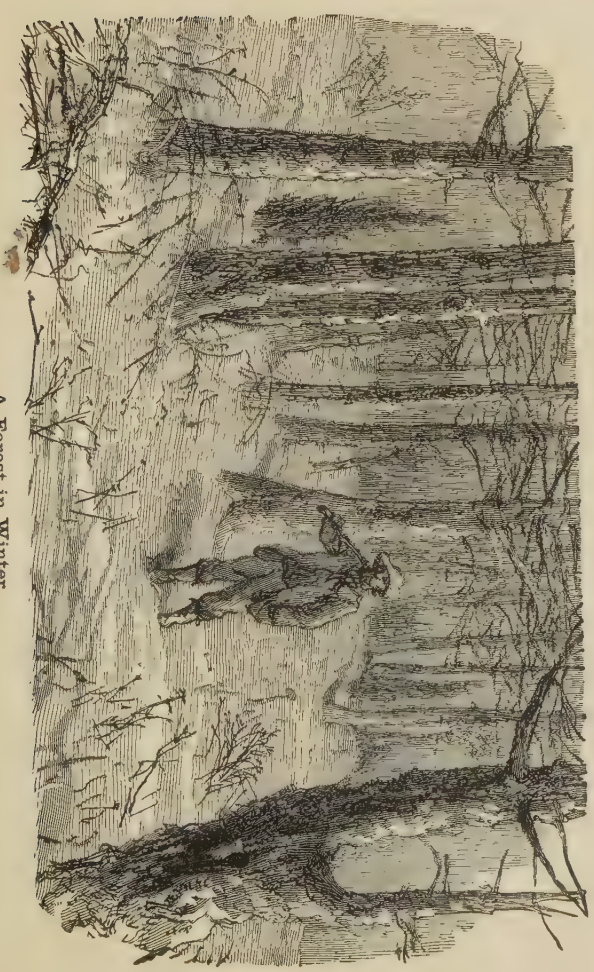
[2] **Swath**, *swawth*.

4. Down we go, very slowly and carefully, until the water deepens. We then take to the paddles and make rapid progress.

5. After a mile of still water we are brought up by a beaver-dam, showing an almost dry river-bed below it. Canoes are drawn up and the dam is demolished in a few minutes, giving a couple of nights' hard labor to the industrious families whose houses we had passed a little way above the dam. We have to wait for half an hour to give the water a start of us, and then off again, poling, wading, and paddling down the stream, until the sinking sun indicates time to camp.

6. In a few minutes, canoes are unladen, two tents pitched, soft beds of fir-tops spread evenly within them, wood cut, and bright fires kindled more for cheerfulness than warmth. A box of hard bread is opened, tea made, and supper is ready.

7. Sunrise finds us up; breakfast is soon over, tents are struck, canoes loaded, and we are on our way down the deepening stream. It is a river now, with plenty of trout in the shallows, and salmon in the deep pools. About noon we turn sharp off to the eastward up a little brawling brook, forcing our way with some difficulty up its shallow rapids till it gets too dry, and we are compelled to go ashore and to "carry" over to the lake whither we are bound. One of us stops behind to make a fire, boil the kettle, and prepare the dinner, while each Indian swings a canoe on his shoulders and starts through the woods. In three trips everything is carried across and we embark upon a lovely lake.



A Forest in Winter.

8. The "carry" was not long, and there was a good blazed trail, so that it was a comparatively easy job; but under the most favorable circumstances this portaging,[1] or carrying, is very hard work. It is hard enough to have to lift eighty or one hundred pounds on your back. It is worse when you have to carry the burden half a mile, and get back as quickly as you can for another load; and when you have to crawl under fallen limbs, climb over prostrate logs, balance yourself on slippery tree-trunks, flounder though bogs, get tangled up in alder swamps, force yourself through branches which slap you viciously[2] in the face, with a big load on your back, a hot sun overhead, and several mosquitoes[3] on your nose, it is almost beyond endurance. But it has to be done, and the best way is to take it coolly.

9. Out on the lake it was blowing a gale, and right against us. We had to kneel in the bottom of the canoes, and vigorously ply our paddles. The heavily-laden craft plunged into the waves, shipping water at every jump, and sending the spray flying into our faces. Sometimes we would make good way, and then, in a squall,[4] we would not gain an inch, and be almost driven on shore; but after much labor we gained the shelter of a projecting point, and late in the evening reached our destination, and drew up our canoes for the last time.

10. The Indian carries your blanket, your coat, a little tea, sugar, and bread, a kettle, and two tin pans.

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[1] **Portaging,** *port'ag-ing.*
[2] **Viciously,** *vish'us-le.*
[3] **Mosquitos,** *mus-kē'tōz.*
[4] **Squall,** *squawl.*

The hunter has enough to do to carry himself, his rifle, ammunition, a small axe, hunting-knife, and a pair of field-glasses. Thus provided, you plunge into the woods, the sun your guide in clear weather, your pocket-compass if it is cloudy, the beasts and birds and fishes your companions, and wander through the woods at will, sleeping where the fancy seizes you, "calling" if the nights are calm, or still-hunting on a windy day. Calling is the most fascinating, disappointing and exciting of all sports.

11. Moose-calling consists in imitating the cry of the animal with a hollow cone made of birch bark, and endeavoring, by this means, to call up a moose near enough to get a shot at him by moonlight or in the early morning. He will come straight up to you, within a few yards—walk right over you almost—answering, ("speaking," as the Indians term it,) as he comes along, if nothing happen to scare him.

12. The great advantage of moose-calling is, that it takes one out in the woods during the most beautiful period of the whole year; when nature, tired with the labor of spring and summer, puts on her holiday garments, and rests luxuriously before falling into the deep sleep of winter. The great heats are past, though the days are still warm and sunny; the nights are calm and peaceful, the mornings cool, the evenings so rich in coloring that they seem to dye the whole woodland with sunset hues; for the maple, oak, birch, and beech trees glow with a gorgeousness unknown to similar trees in England.

13. If the day is windy you can track the moose and the car'iboo, or perchance a bear, through the

deep, shady recess'es of the forest. On a still day you may steal noiselessly over the smooth surface of some lake, or along a quiet reach of a river.

14. Just beyond us is a little clump of pines, and all around, a gray meadow, quite open for about fifty yards, then dotted with occasional firs with long tresses of gray moss hanging from their stunted limbs. The trees grow closer and more vigorous till they merge into the gloomy, unbroken forest beyond.

15. Haunting[1] these solitudes[2] are birds and beasts, the hooting owl, the beaver, the wolf, the cariboo a kind of reindeer, and the huge, ungainly moose.

16. Scarcely had I sat down before I heard old John call gently like a moose to attract my attention. Now it must be borne in mind that, when

[1] **Haunting,** *hänt'ing.*

[2] **Solitudes,** *sŏl'i-tūdes.*

hunting, you never call or speak like a human being, for to do so might scare away game; but you may grunt like a moose, hoot like an owl, or imitate any sound made by any of the brute creation. I crept up quickly, and in obedience to John's whisper gave him the moose-caller, and following the direction of his eyes, saw a small moose slowly crossing the barren some four or five hundred yards to our left.

17. The moose came on boldly. We planted ourselves right in his way, just on the edge of the woods, and crouching close to the ground, waited for him. Presently we heard his hoarse voice close to us, and the crackling of the bushes as he passed through them; then silence fell again, and we heard nothing but the thumping of our hearts; another advance and he stopped once more, within apparently about fifty yards of us.

18. After a long, almost insupportable pause, he came on again; we could hear his footsteps, we could hear the grass rustling, we could hear him breathing, we could see the bushes shaking, but we could not make out even the faintest outline of him in the dark. Again he stopped, and our hearts seemed to stand still also with expectation; another step must have brought him out almost within reach of me, when suddenly there was a tremendous crash!

19. He had discovered us, and was off with a crackling of dead limbs, rattling of horns, and smashing of branches, which made the woods resound again. Disappointed we were, but not unhappy, for the first duty of the hunter is to drill himself into

that peculiar frame of mind which enables a man to exult when he is successful, and to accept defeat without giving way to despondency.

20. After awhile we espied a bear, and although having a good opportunity, I made a bad shot, striking the animal too low down on the shoulder, and only breaking his leg. With a violent snort of pain and astonishment, but without looking round for a second to see what was the matter, away went "bruin" down the mountain-side at a most surprising pace. "Come on," yelled John; "try and head him off; if he once gets down into the timber he is gone sure." And away we went after him as hard as we could tear.

21. How John jumped and bounded and yelled, and how the bear did bound down that hillside! He seemed to go twice as fast on three legs as any other animal ever went on four. Sometimes John would head the bear and turn him, sometimes the bear would make a drive at John and turn him, which would give me time to get up; and so we went on yelling and whooping and plunging through the tangled, matted junipers,[1] the bear doubling and twisting and sometimes charging us, but always struggling gallantly to gain the shelter of the woods.

22. I missed the bear several times, until at last with a successful shot I rolled him over, and John and I threw ourselves down exhausted beside his dead body.

EARL OF DUNRAVEN.

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[1] Junipers, *jū'ne-purz*

VIII. MINING: COAL, IRON, ETC.

1. To get coal, men must sink a shaft; that is, they must dig a great hole in the ground until they come to where the coal is best and most abundant. The hole or shaft must be large enough for very large buckets full of coal to be raised up from the bottom; and to raise these there must be a steam-engine at the mouth of the shaft. This must have a house built over it to protect the machinery and the workmen, and this is the house that you see in the chart.

Blackboard Drawing of a Mine, Shaft, Chute, and Engine-house.

2. Down below, at the bottom of the shaft, men are working away with pickaxes and shovels, making passages wherever they find coal. These passages are called galleries. In a coal-miner's life there are many dangers. Sometimes the sides or roof of the gallery fall on him

and crush him; sometimes the choke-damp (coal-gas, or carbonic acid) comes and chokes him to death; and sometimes the "fire-damp" (explosive gas) comes, and blows him like a bullet along the gallery or up the shaft, and sometimes it is strong enough to blow the mine to pieces, shattering the steam-engine and breaking into little sticks the house that covers it.

3. Sir Humphry Davy, who was once a poor boy, invented a safety-lamp for the miners. He surrounded a common lamp with fine wire gauze, so that the flame could not get through it to set fire to the explosive gas; yet, strange to say, the gas will go through the wire gauze and burn quietly in the lamp, thus helping the miner by giving him light instead of blowing him to pieces.

4. This fire-damp that kills these miners is pretty much the same as the gas that burns so quietly in our houses (being carbureted hydrogen mixed with some olefiant gas). If, when ordinary gas (carbureted hydrogen) has been leaking to a certain extent in a room, any person enters that room with a lighted candle, just such an explosion takes place in that room as at the bottom of a mine. Explosions in mines happen every year in this country, especially in **Pennsylvania,** also in **England** and **Wales,** and many persons have been thus injured.

5. It is curious to get into one of these big coal-buckets and be lowered down to the bottom of the shaft. What seemed from the top to be like little stars or glow-worms moving about below, turn out to be little lamps fast-

ened in front of the miners' caps, so as to give them light and leave both their hands free to hold the pickaxe or the shovel.

6. When the coal has reached the top of the shaft, it is put into small cars that run on a sloping railroad or tramway, such as you can see in the large chart, until it reaches a railroad, along which it is drawn to some place where it is sold for use, or to some place where it can be put into canal-boats, or ships, and go wherever water goes.

Interior of a Coal-Mine.

7. Many coal-mines are reached from the side of a mountain or hill by way of a kind of tunnel instead of a shaft. Coal is brought from the inside of the mine to the opening, mostly in small cars which are moved by horses or mules and sometimes by the miners themselves.

8. One kind of coal, called first in **Lan-**

cashire, in **England,** cannel coal (that is, candle or can'le coal), will burn like pine wood. If you take a splinter of it and hold it in the flame of a candle, it will take fire and continue to burn, giving out a light like a candle. This kind of coal can also be turned in the turning-lathe as wood is turned, and sometimes snuff-boxes are made from it.

9. The gas we burn in our houses is made from coal, which, therefore, not only warms us in winter, but cooks our supper and gives us light to eat it by.

10. Many millions of tons of coal are produced every year. Our steamboats, ocean steamers, locomotives, and steam-engines use up many tons of this black fuel.

11. Coal has been in use in England for nearly six hundred years. In the reign of Edward I. (1272–1307) the use of coal was forbidden because its smoke was said to be injurious to health.

12. In this country what are called coal-fields have an extent of about 300,000 square miles. You must not imagine, however, that all this country looks black with coal. On the contrary, very little of it crops out on the surface, and you may have a very fine farm with all its trees and crops spread out over a valuable coal-mine, so that they may both be worked without interfering with one another.

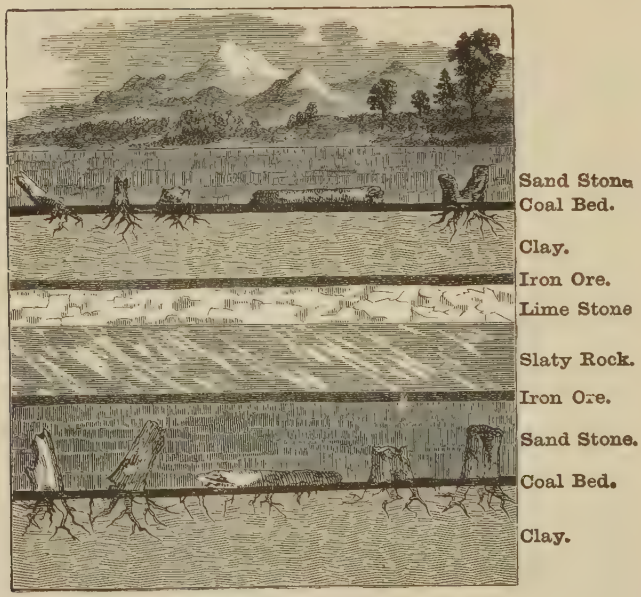
13. You learned in the previous chapter how necessary leaves are to the life and growth of a tree, and how valuable some kinds are, such as those of the tea and the tobacco plant; but do you see any use in the leaves of the forest after they have withered and fallen in the autumn?

14. If you should dig down in the ground you would see that the soil at the top is black and rich, while deeper down it is light-colored and poor. The blackness and richness of the surface soil is due chiefly to the withered leaves which fell from year to year and went to decay; thus you may trace back the abundance of your bread, through large crops of wheat and rich soil, to dead leaves or dead grass.

15. That is not all: geologists* tell us, among many other wonderful and interesting things, that they have traced the coal which miners dig out of the earth away back to trees, plants, leaves, etc., which had become buried in great masses under the surface of the earth.

16. Just how all these immense beds of coal were made, learned men have not agreed. They appear to have been made in some mysterious manner, long, long ago, from trees, plants, and seeds (especially ferns and mosses), because the

* Men who have studied the formation of the earth—its rocks, mountains, soils, etc.



Interior or Sectional View in the Coal Regions.

remains and impressions of such have been found in them. It is also probable that the water on the earth, the heat inside of the earth, volcanic action, and several successive elevations and depressions of the surface had a good deal to do with the formation of coal.

17. Charcoal is made by covering, almost entirely, a large pile of wood with sod and earth and setting it on fire.

18. Coke bears the same relation to coal that charcoal does to wood. The coal is heated in air-tight iron vessels, from which tubes run into water, so that all the gas may bubble through into another vessel and be drawn thence to light our houses. Thus we contrive to make coke and gas at the same time.

19. The coke we burn in our grates to warm us; and the gas, in our gas-burners to give us light.

20. The annual coal production of the world is about 300,000,000 tons; one-half of which is obtained in Great Britain, one-sixth in the United States, one-sixth in Germany, and nearly all the rest in France, Belgium, and Austria. The deepest mines in the world are in England. They are more than 2,000 feet beneath the surface of the earth. One is over 2,400 feet in depth.

21. There are many things represented in the chart that are made of iron. Mention some of them.

22. Iron is the most useful metal in the world; it is far more useful to us than gold and silver. Iron is very seldom found pure. It is almost always mixed with other substances, and this mixture is called iron ore. To get the iron from this, men build large furnaces of fire-proof brick, and after they have built a very hot fire in the bottom of one of these they put in a quantity of iron ore, then about as much limestone broken up into a convenient size, and then on top of the limestone about as much coal.

23. Thus they keep putting in layers of ore, limestone, and coal until the whole furnace, which is sometimes sixty feet high, is filled up to the top. As the mass sinks down they put on more to keep the furnace always full. The fire burns all through this mass, so that the ore is melted; a part of which mixes with the heated limestone, making what is called slag, and leaving the iron free to run down below. This the iron is sure to do, because it is heavier than all the other things.

24. The fire in the furnace is kept up day and night, and on Sundays as well, because if they were to allow the fire to go out, it would take about a week to get it in order again. But the same men do not work at it all the time; there are two sets or gangs of them, and their time is arranged so that each gang shall have the same amount of night-work. Twice a day they let the melted iron run out of the furnace and conduct it along narrow earthen gutters into hollows or molds of sand or iron, about three feet long and three inches wide as well as deep.

25. These, from their lying side by side like a litter of pigs, are called pig-iron. This is again melted to make anything of cast-iron, and is poured into very smooth earthen molds of the desired shape. All our iron stoves are made of such castings.

26. To make wrought-iron, the pig-iron is melted, and a convenient quantity is lifted out and beaten with hammers continually while hot, and in every direction, until it is sufficiently thus "wrought," which makes it tough and flexible.

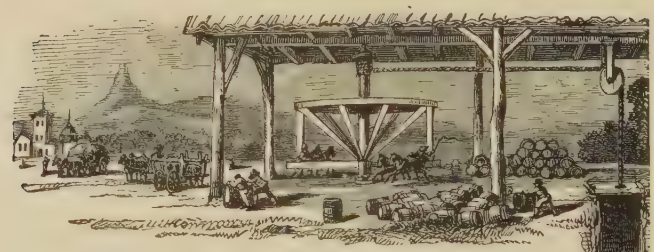
27. This is then made into bars or chains or any other shape that is preferred. It is also rolled while hot between rollers with grooves in them so as to make long bars of different shapes and thicknesses for different purposes. Wire also is made from wrought-iron.

28. To make steel, this iron is heated again with charcoal; part of the charcoal goes into the iron and makes it capable of being tempered in the fire, so as to be made very hard and very elastic, taking thus a finer edge when made into tools and ground. It is from this that we get all our knives, hatchets, axes, chisels, gouges, adzes, and other tools. Razors are made from the best and finest steel, and when carefully ground and sharpened have a very fine cutting edge.

29. More iron is obtained in England than in any other country in the world; and in Pennsylvania, than in any other State in the Union.

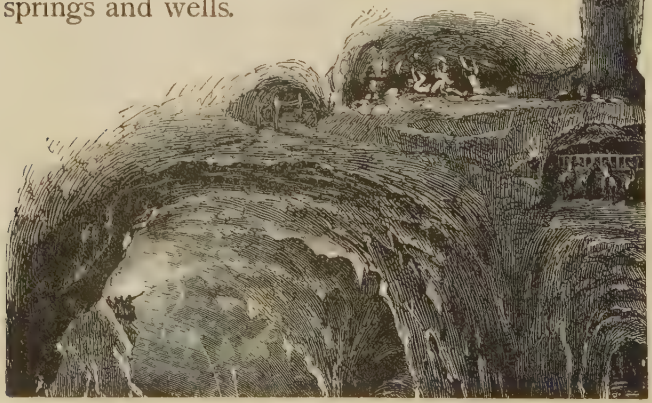
30. In Missouri is Iron Mountain, a mass of iron 200 feet high, covering an area of 500 acres.

31. The place most noted for the manufacture of knives is Sheffield, a town in England.



32. The salt-mines in the northern part of **Austria** are about 1,000 feet in depth and two miles in length. They contain many great rooms, galleries, and passages, all cut out by the miners. There are valuable salt-mines also in **Russia, England, Germany, Italy,** and **Spain.**

33. Salt is obtained not only from mines, but also from the water of the ocean, salt springs and wells, which you have already learned in the chapter on springs and wells.



A Famous Salt-mine in Austria.

Silver-mines in Colorado.

34. Silver-mining is carried on very extensively in the States of **Nevada** and **Colorado,** where some men have become immensely rich almost in a single day, owing to the discovery of silver on their land.

35. Many of the mines are far up high mountains and reach to great distances within them.

36. Silver is found also in Utah, Montana, and other Territories of the United States. It was formerly found in large quantities in Mexico, Bolivia, and Peru.

37. It is said that many years ago an Indian hunter in South America, in pulling up a shrub, observed something white and shining clinging to the roots, and that this led to the discovery of a mountain almost filled with silver.

38. Gold, the most precious of all the metals is found not only in deep mines like those of iron, coal, or silver—

39. It has been found in the sands of streams, into which it has been carried from the crumbling rocks by rains, and from which it is obtained by washing. Considerable gold is obtained by directing a powerful stream of water against the rocks by means of a hose, which is supplied from large collections of water on higher ground. This is called hydraulic mining.

Gold-washing.

40. Pure gold is too soft for general use, therefore it is mixed with silver or copper, which are harder; it is then said to be *alloyed*, or reduced in purity.

41. For gilding, a portion of gold is hammered out into leaves so thin that several hundred of them together would be no thicker than one of the leaves of your book.

42. **California, Nevada,** and **Australia** have long been celebrated for gold.

43. Copper ore is found in several countries and States, especially in the **Republic of Chili** and in the State of **Michigan,** along the shores of **Lake Superior.**

44. Tin ore is obtained principally from the mines of **England, Australia,** the **Malay Peninsula,** and two islands, **Banca** and **Billiton,** which lie southeast of that peninsula.

45. In **Cornwall,** the most southwestern county in **England,** are hundreds of mines of tin and copper, some of which extend far out from the shore and under the bed of the ocean; in these the moaning of the restless waves overhead is always heard, and their roaring while a storm lasts is fearful to listen to.

46. Tin is white and bright, but too soft for ordinary use; therefore, sheets of iron are dipped into melted tin, enough of which adheres to the iron to form a thin white coating. Sheet-iron thus coated is the substance of which tin cups, pans, etc., are made, and with which the roofs of some houses are covered. You see, therefore, that a tin cup is really made of iron.

47. Bronze and bell-metal are made of copper and tin mixed together. Brass is made of copper and zinc mixed together. There are, consequently, no mines or ores of brass or bronze.

48. Zinc is a metal of a bluish gray tint. It is extensively mined in several countries in **Europe,** and in the States of **Wisconsin, Missouri, New Jersey,** and **Pennsylvania.**

49. Lead is mined very extensively in **Wisconsin, Illinois, Iowa,** and **Missouri.** It is used in roofing houses, lining tanks, and in making bullets, shot, and water-pipes.

50. Lead pencils are made of a mineral called plumbago, which is not lead, but a kind of coal. Extensive mines of this substance are found in **England** and **Siberia.**

IX. DANGERS IN THE MINES.

"THERE is danger in the mines, old man," I said to an aged miner, who, with his arms bent, leaned against the side of an immense vault, absorbed in meditation; "it must be a fearful life."

2. The old man looked at me with a steadfast but somewhat vacant stare, and then in half-broken sentences he uttered, "Danger—where is there not?—on the earth or beneath it—in the mountain or in the valley—on the ocean or in the quiet of nature's most hidden spot—where is there not danger?—where has not death left some token of his presence?

3. "True," I replied, "but the vicissitudes of life are various; the sailor seeks his living on the waters, and he knows each moment that they may engulf him; the hunter braves death in the wild woods, and the soldier on the battle-field, and the miner knows not but the spot where he now stands, to-morrow may be his tomb."

4. "It is so, indeed;" replied the old man; "we find death in the means we seek to perpetuate life; 'tis a strange riddle; who shall solve it?"

5. "Have you long followed this occupation?" I asked, somewhat struck by the old man's manner.

6. "From a boy; I drew my first breath in the mines,—I shall yield it up in their gloom."

7. "You have seen some of those vicissitudes to which you have just now alluded?"

8. "Yes!" he replied with a faltering voice, "I have; there was a time that three tall boys looked up to me and called me father. They were sturdy fellows! Now, it seems but yesterday that they stood before me so proud in their strength, and I was filled with a father's vanity.

9. "Where are they now?

10. "I saw the youngest—he was the dearest of the flock, his mother's spirit seemed to have settled on him—crushed at my feet, a bleeding mass. One moment, and his light laugh was in my ears; the next, and the large mass came. There was no cry—no look of terror; but the transition to eternity was as the lightning's flash, and my poor boy lay crushed beneath the fearful load. It was an awful moment.

11. "But my cup of affliction was not yet full. I had still two sons. They, too, were taken from me. Side by side they died, the fire-damp caught their breath, and left them lifeless. They brought them home to the old man, and told him that he was childless and alone. It is a strange decree that the plant should thus survive the stripling things it shaded, and for whom it would have died a thousand times. Is it surprising that I should wish to die in the mines?"

12. "You have indeed," I replied, "been acquainted with grief. Whence did you derive consolation?"

13. The old man looked up, "From heaven."

HOOD.

X. DESCENT INTO A SALT MINE.

FAR away, in Eastern Europe, the traveler comes upon a long, low range of hills, stretching from east to west, which enclose, with their soft outlines and well-wooded slopes, a lovely valley, dotted here and there with smaller hills and little knōlls.

2. It is a busy scene to which he comes, and men are moving briskly about through the narrow streets. They wear a strange costume of sombre black, and have thick leather aprons tied on behind instead of in front; they look cheerful and happy, and many a merry song and sweet car'ol is heard far and near.

3. The traveler engages one of these men to show him the way into the mysterious world below, of which he has heard much; and soon he finds himself arrayed in a white blouse[1] and black velvet cap, such as are kept ready for visitors, at the mouth of the shaft.

[1] **Blouse,** *blouze.*

4. The two descend and soon the traveler finds himself in a vast underground cor'ridor, cut out of salt. As soon as his eyes become accustomed to the dim light of the candle stuck in his hat, he sees huge blocks of the precious material lying about, some colorless, some shining in beautiful though subdued blue; the vaulted ceiling rests on gigantic pillars, in which each ti'ny grain shines brightly and sparkles as the light falls upon it. A little further on the miners are hard at work; they attack the mountain-side, and cut out immense blocks.

5. As the traveler wanders on through the long dark passages, with statues in niches and at the corners, he passes large vaulted rooms, dark caves, and huge recess'es, that seem to have no end, and at times he comes upon stairs, cut in the rock, which he has to descend cautiously, so smooth and slippery is the material of which they are formed.

6. Suddenly he sees bright lights before him, and, dazzled and surprised, he enters a vast cathedral, the walls of which shine and shimmer all around in fanciful flitting lights, as the light of torches and candles falls upon the bright masses of salt; there is the altar with its colos'sal cross, and at the side the organ and choir;[1] here also images abound on all sides cut out in the yielding material.

7. Further on, the traveler sees a smaller chapel devoted to the memory of the pious wife of one of Poland's early kings, who had, in 1252, the honor of bestowing the knowledge of these wondrous treasures on her impoverished subjects.

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[1] Choir, *kwire*.

XI. FLINT AND STEEL.

THE Flint and Steel—the story goes—
Old friends by natural relation,
Fell out, one day, and like two foes,
Indulged in bitter altercation.

"I'm weary," said the angry Flint,
"Of being beat: 'tis past concealing;
Your conduct (witness many a dint
Upon my sides!) is most unfeeling.

"And what reward have I to show?
What sort of payment do you render
To one who hears each hateful blow
That you may blaze in transient splendor?

"You seem to think yourself abused,"
The Steel replied with proper spirit;
"But, say, unless with me you're used,
What praise of service do you merit?

"Your worth, as any one may see
(For all your feeling of defiance),
Is simply nought, unless with me
You keep your natural alliance."

"True!" said the Flint; "but there's no call,
Whate'er my worth, for you to flout it;
My value, sir! may be but small;
But think what yours would be without it!"

J. G. SAXE.

XII. THE COAL MINE.

MANY plants have been found in a pet'rified state in the rocks of the coal formation. There they are preserved for us in the most wonderful museum[1] in the world. It is astonishing sometimes to find that the texture—the fibres and the pulp—have all preserved their forms unaltered, though the substance itself has entirely disappeared.

2. A Town Hall in Germany contains a staircase of sandstone, each fragment of which clearly indicates that it was originally of wood.

3. One of the most marvelous natural curiosities which attract geologists to Tasmania, is the "*forest of petrified trees*," a great number of which are transformed into the most beautiful opal.[2]

4. These trees are standing upright, and it would seem that they were in full growth when the burning lava overwhelmed them. Some fragments have been carefully examined, and looked so full of life, so absolutely like wood, that only a very careful examination brought the conviction that they were really stone.

5. Coal was formed, as we know, by the great wealth of primitive vegetation that covered the whole earth. Every one has observed that in damp cellars, in which dry wood is kept during winter, there is a soft-wood layer left behind, which looks like vegetable mould, and it is also well known how our marsh-

[1] **Museum,** *mū-zē'um*, not *mu'*. [2] **Opal,** *ō'pl.*

plants are gradually changed into peat. In a similar but far more powerful manner was our early vegetation converted into coal.

6. At that early day, it appears that the vegetable world was preparing for man the fuel necessary for his comfort and industry.

XIII. EUREKA—I HAVE FOUND IT.

(THE LESSON OF THE BATH.)

ONE of the most valuable discoveries made by Archimedes,[1] the famous scholar of Syr'acuse, in Sicily, relates to the weight of bodies immersed in water.

2. Hiero, king of Syracuse, had given a lump of gold to be made into a crown, and when it came back he suspected that the workmen had kept back some of the gold, and had made up the weight by substituting silver; but he had no means of proving this, because they had made it weigh as much as the gold which had been sent.

3. Archimedes, puzzling over this problem, went to his bath. As he stepped in he saw the water, which his body displaced, rise to a higher level in the bath, and to the astonishment of his servants he sprang out of the water, and ran home through the streets of Syracuse almost naked, crying, "*Eureka!*[2] *Eurcka!*" ("I have found it! I have found it!")

[1] **Archimedes**, *Ar-ki-mē'dez*, the most celebrated mathematician and inventor previous to 287 B. C.

[2] **Eureka**, *u-rē'kä*, Greek for "I have found it."

4. What had he found? He had discovered that any solid body put into a vessel of water displaces a quantity of water equal to its own bulk, and therefore that equal weights of two substances, one light and bulky, and the other heavy and small, will displace different quantities of water.

5. This discovery enabled him to solve his problem. He procured one lump of gold and another of silver, each weighing exactly the same as the crown. Of course the lumps were not the same size, because silver is lighter than gold, and so it takes more of it to make up the same weight. He first put the gold into a basin of water, and marked on the side of the vessel the height to which the water rose.

6. Next, taking out the gold, he put in the silver, which, though it weighed the same, yet, being larger, made the water rise higher; and this height he also marked. Lastly, he took out the silver and put in the crown.

7. Now, if the crown had been pure gold, the water would have risen only up to the mark of the gold; but it rose higher, and stood between the gold and silver marks, showing that silver had been mixed with the gold, making the crown more bulky; and by calculating how much water was displaced, Archime'des could estimate how much silver had been added.

8. This was the first attempt to measure the *specific gravity* of different substances; that is, the weight of any particular substance compared to an equal bulk of some other substance taken as a standard. In weighing solids or liquids, water is the usual standard.

A Volcano and other Mountains.

XIV. MOUNTAINS, VOLCANOES.

1. Here is a volcano, which is a burning mountain. Sometimes volcanoes throw out red-hot stones, sometimes melted stones called lava, sometimes smoke, and sometimes ashes. Most of them are along the **Pacific** coasts of Asia and South America. There are more than a thousand volcanoes in the world. They are useful in preventing earthquakes; in supplying us with sulphur, with some fine kinds of lava, from which bracelets and breast-pins are made, and with pumice-stone, which is the froth that floats sometimes on streams of lava.

2. In 1783 a volcano in **Iceland** sent out two streams of lava, one 40 miles long and 7 miles wide, and the other 50 miles long and 15 miles wide. These streams were from 100 to 600 feet deep. In this eruption 11,000 cows, 27,000 horses, and 186,000 sheep perished.

3. In the island of **Java** is a volcano (Papanday-ang) which, in 1772, threw out ashes and cinders so as to cover the earth fifty feet deep for a distance of seven miles all around the mountain, thus destroying forty villages and twenty thousand people.

4. Sometimes volcanoes rise from the sea. This happened in 1866, near the **Navigators' Islands,** in the **Pacific.** Stones, mud, and dust were thrown up 2,000 feet. Some of the, stones going down met others coming up with a terrible crash. For half a mile around the water was in terrible commotion. Heaps of dead fish were washed ashore, and among them some strange monsters, from six to ten feet long, such as the natives had never seen before; while the atmosphere for miles around was heated and filled with smoke, ashes, and sulphurous vapors.

5. North of **Sicily** are the **Lipari** (*lip'a-re*) **Islands.** On one of these is a volcano named **Stromboli** (*strom'-bo-le*), which has given out lava for 2,000 years, and, from its constant light, has been called the light-house of the Mediterranean.

6. The best-known volcano in the world is **Vesuvius,** which is in **Italy,** near the city of **Naples.** This was not known to be a volcano until the year 79, or about eighteen centuries ago, when it suddenly burst forth and sent out such an immense quantity of ashes and cinders as to overwhelm two cities situated near it. These cities were named Herculaneum and

Pompeii (*pom-pay'e*). Almost all their inhabitants managed to escape. The ashes that fell upon Herculaneum were mixed with steam, so that the moist ashes gradually hardened into stone.

7. Pompeii was covered over with dry ashes so completely that nothing could be seen of it. Thus it remained buried until 1748, when it was accidentally discovered. Excavations were then commenced and have continued to the present day. About one-third of the city has been uncovered, and you can now walk along the streets and look into the houses, and see exactly how people lived in those days.

8. Vesuvius frequently pours out lava, and travelers often stand close by a stream of lava flowing from it, and see smoke issuing from its crater.

9. A story is told of a Roman soldier who was guarding one of the gates of that ancient city at the time it was destroyed. Although the people rushed wildly past him, in their anxiety to escape suffocation and death, he stood at his post, and, unfortunately, having no orders to leave it, he remained and perished. When the great heaps of ashes were carried away from that part of the city nearly seventeen centuries afterwards his skeleton was found on the spot, with his weapons beside it.

10. The ruins include those of dwellings, temples, theatres, statues, fountains, etc.

XV. THE ERUPTION OF VESUVIUS.

DELIGHTFULLY situated at the foot of Vesuvius, on the beautiful Bay of Naples, were the two cities of Pompeii and Herculaneum, which, at the height of Rome's greatness, were famous resorts of Romans of wealth and rank. Beautiful vineyards and gardens covered the mountain slopes, and heathen temples, baths, statues, fountains, and mosaic pavements adorned the towns. This, the first recorded eruption of the mountain, lasted eight days and nights.

2. Pliny the younger, a Roman author of that time, described the sudden appearance of a cloud which rose in the afternoon of August 24, A. D. 79, over Vesuvius, shooting upward to a great height and spreading at the top like a pine tree; then the showers of ashes and cinders which filled the atmosphere, producing intense darkness that continued three days. His uncle, the elder Pliny, then admiral of the fleet near by, went to the assistance of the people on shore. Hot cinders fell on the decks of the ships, and flames were raging on the land.

Here Cicero, the great Roman orator, statesman, and philosopher, sought relief from the midsummer heats of the Imperial City (Rome) in his magnificent villa. This was before the Christian era. Pompeii previous to its destruction was surrounded by a massive stone wall, about two miles in length, with towers and gates. The streets were narrow (12 to 30 feet) and paved with blocks of stone (lava).

The earthquake which occurred 16 years before the eruption caused considerable damage to some of the buildings, now visible in the cracks and propped walls of the uncovered portion.

The dwellings, which were generally low, small, and built of brick, enclosed delightful courtyards, where tropical plants, cool fountains, rich vines, and various works of art, gratified the luxurious tastes of the inhabitants, who were accustomed to pass most of their time in the open air.

3. Retreating to the shore in the intense darkness, protected with pillows on their heads, they found the sea too tempestuous for them to embark. The admiral lay down exhausted upon a sail on the shore, and his companions fled before the sulph'urous flames. Here his body was found three days afterward.

4. According to Bulwer, the immense amphithe'ater of Pompeii was crowded with people to witness cruel sports—the fighting of gladiators and the destruction of a criminal by the lion and the tiger. These horrible performances were suddenly arrested.

I. The Last Days of Pompeii.

THE eyes of the crowd beheld, with dismay, a vast vapor shooting from the summit[1] of Vesuvius in the form of a gigantic[2] pine-tree; the trunk, blackness—the branches fire!—a fire that shifted and wavered in its hues with every moment, now fiercely luminous, now of a dull and dying red, and that again blazed terrifically forth with intolerable glare!

2. There was a dead, heart-sunken silence; through which there suddenly broke the roar of the lion, that was echoed back from within the building by the sharper and fiercer yells of its fellow-beast. Dread se'ers were they of the Burden of the Atmosphere, and wild prophets of the wrath to come!

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[1] **Sum'mit**, top. [2] **Gigantic**, *ji-ghan'tik.*

The amphitheater, situated in a corner of the city, was an ellipse, 430 by 335 feet in extent, capable of seating 10,000 persons, or about half the population of the city.

3. Then there arose on high the universal shrieks of women; the men stared at each other, but were dumb. At that moment they felt the earth shake under their feet; the walls of the theater trembled; and, beyond in the distance, they heard the crash of falling roofs; an instant more, and the mountain cloud seemed to roll toward them, dark and rapid, like a torrent; at the same time, it cast forth from its bosom a shower of ashes mixed with vast fragments of burning stone!

4. Over the crushing vines, over the desolate streets, over the amphitheater itself, far and wide, with many a mighty splash in the agitated sea, fell that awful shower!

5. No longer thought the crowd of vengeance or of sport; safety for themselves was their sole thought. Each turned to fly—each dashing, pressing, crushing against the other. Tramping recklessly over the fallen, amid groans, and oaths, and prayers, and sudden shrieks, the enormous crowd vomited itself forth through the numerous passages.

6. Whither should they fly! Some, anticipating a second earthquake, hastened to their homes to load themselves with their more costly goods, and escape while it was yet time; others, dreading the showers of ashes that now fell fast, torrent upon torrent, over the streets, rushed under the roofs of the nearest houses, or temples, or sheds (shelter of any kind), for protection from the terrors of the open air. But darker and larger and mightier spread the cloud above them. It was a sudden and more ghastly night rushing upon the realm of noon!

7. How the darkness gathers! What sudden blazes of lightning! How they dart and quiver!

8. What sound is that?—the hissing of fiery water! What! does the cloud give rain as well as flame?

9. Amid the other horrors, the mighty mountain now cast up columns of boiling water. Blent and kneaded[1] with the half-burning ashes, the streams fell like seething mud over the streets in frequent intervals.

10. The streets were already thinned; the crowd had hastened to disperse itself under shelter; the ashes began to fill up the lower parts of the town: but, here and there, you heard the weary foot-steps of fugitives,[2] or saw the pale and haggard faces by the blue glare of the lightning, or the more unsteady glare of torches, by which they endeavored to steer their steps. But ever and anon, the boiling water, the straggling ashes, or mysterious and gusty winds rising and dying in a breath, extinguished these wandering lights, and with them the last living hope of those who bore them.

11. "Help there! Help!" cried a frightened voice, "I have fallen down—my torch has gone out—ten thousand sesterces to him who helps me—oh, help me, give me thy hand." See!—they have placed a light within yon arch at the gate; by that let us guide our steps.

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[1] **Kneaded,** *need'ed.* [2] **Fugitives,** *fū'ji-tivz.* [3] Value 4 cents.

Volcanic lightnings. These phenomena were especially characteristic of the long-subsequent eruption of 1799, and their evidence is visible in the tokens of that more awful one here described.

12. The air became still for a few minutes; the lamp from the gate streamed out far and clear; the fugitives hurried on—they gained the gate—they passed by the Roman sentry; the lightning flashed over his liv'id face and his polished hel'met, but his stern features were composed even in his awe. He remained erect and motionless at his post. That hour itself had not animated the machine of the ruthless majesty of Rome into the reasoning and self-acting man. There he stood, amid the crashing elements; he had not received the permission to desert his station and escape.

II. Flames, Falling Ashes, and Stones.

THE cloud, which had scattered so deep a murk'iness over the day, had now settled into a solid and impen'etrable mass. It resembled less even the thickest gloom of a night in the open air than the close and blind darkness of some narrow room. But in proportion as the blackness gathered, did the lightnings around Vesuvius increase in their viv'id and scorching glare.

A large building has been uncovered, which is supposed to have been the barracks of troops, or of gladiators. Numerous implements of war have been collected there, and in and around the building were found 64 skeletons, probably of the guard who remained at their posts unmoved by the catastrophe—a remarkable and affecting proof, it has been said, of the discipline of the Roman soldier.

The buried city of Pompeii was discovered by accident, in digging a well.

Numerous statues, vases, bronzes, and mosaics of unsurpassed magnificence, and other works of art taken from the ruins since the discovery, are now on exhibition in the muse'um at Naples.

2. Nor was their horrible beauty confined to the usual hues of fire; no rainbow ever ri'valed their varying dyes. Now brightly blue as the most azure[1] depth of a southern sky—now of a liv'id and snake-like green, darting restlessly to and fro as the folds of an enormous serpent—now of a lu'rid and intolerable crimson, gushing forth through the columns of smoke, far and wide, and lighting up the whole city from arch to arch—then suddenly dying into a sickly paleness!

3. In the pauses of the showers, you heard the rumbling of the earth beneath and the groaning waves of the tortured sea; or, lower still, and audible but to the watch of intensest fear, the grinding and hissing murmur of the escaping gases through the chasms[2] of the distant mountain.

4. Sometimes the cloud appeared to break from its solid mass, and, by the lightning, to assume quaint and vast mimicries of human or of monster shapes, striding across the gloom hurtling one upon the other, and vanishing swiftly into the tur'bulent abyss' of shade; so that, to the eyes and fancies of the affrighted wanderers, the unsubstantial vapors were as the bodily forms of gigantic foes—the agents of terror and death.

5. The ashes in many places were already knee-deep; and the boiling showers which came from the steaming breath of the volcano forced their way into the houses, bearing with them a strong and suf'focating vapor.

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[1] **Azure,** *ăz'ūre*, blue.

[2] **Chasms,** *kăzms.*

6. In some places, immense fragments of rock, hurled upon the house roofs, bore down along the streets masses of confused ruin which, yet more and more with every hour, obstructed the way; and as the day advanced, the motion of the earth was more sensibly felt—the footing seemed to slide and creep —nor could chariot[1] or litter[2] be kept steady, even on the most level ground.

7. Sometimes the huger[3] stones striking against each other as they fell, broke into countless fragments, emitting[4] sparks of fire, which caught whatever was combustible[5] within their reach; and along the plains beyond the city the darkness was terribly relieved; for several houses, and even vineyards, had caught fire.

8. To add to this partial relief of the darkness, the citizens had, here and there in the more public places, such as the porticos[6] of temples and the entrances to the forum,[7] endeavored to place rows of torches; but these rarely continued long; the showers and the winds extinguished them, and the sudden darkness into which their fitful[8] light was converted had something in it doubly terrible and doubly impressive on the impotence[9] of human hopes, the lesson of despair.

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[1] **Chariot,** *chăr'e-ot,* war vehicle—a carriage.
[2] **Lit'ter,** a bed on which persons are carried.
[3] **Huger,** *hūje-er,* larger.
[4] **E-mit'ting,** sending out.
[5] **Com-bus'ti-ble,** easily kindled.
[6] **Porticos,** *por'te-kōze,* spaces enclosed by columns.
[7] **Fo'rum,** meeting place.
[8] **Fit'ful,** irregular.
[9] **Im'po-tence,** weakness.

III. Darkness—The Sea Retreats.

FREQUENTLY, by the momentary light of these torches, parties of fugitives encountered each other, some hurrying toward the sea, others flying from the sea back to the land, for the ocean had retreated rapidly from the shore. An utter darkness lay over it, and upon its groaning and tossing waves, the storm of cinders and rocks fell and without the protection which the streets and roofs afforded on the land.

2. Wild, haggard, ghastly with su′pernatural fears, these groups encountered each other, but without the leisure[1] to speak, consult, or advise; for the showers fell frequently, though not continuously, extinguishing the lights, which showed to each band the death-like faces of the other, and hurrying all to seek ref′uge beneath the nearest shelter.

3. All the elements of civilization seemed to be broken up.

4. Ever and anon, by the flickering lights, you saw the thief hastening by the most solemn authorities of the law, laden with, and fearfully chuckling[2] over, the produce[3] of his sudden gains.

5. If in the darkness, wife was separated from husband, or parent from child, vain was the hope of reunion. Each hurried blindly and confusedly on.

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[1] **Leisure,** *lē′zhur*, freedom from occupation.

[2] **Chuck′ling,** laughing in a suppressed manner.

[3] **Produce,** *prŏd′ūse*, not *pro′doos*, pro′ceeds.

6. The groans of the dying were broken by wild shrieks of women's terror—now near, now distant—which, when heard in the utter darkness, were rendered doubly appalling[2] by the crushing sense of helplessness and the uncertainty of the perils around.

7. Clear and distinct through all were the mighty and various noises from the Fatal Mountain; its rushing winds; its whirling torrents; and, from time to time, the burst and roar of some more fiery and fierce explosion.

8. Ever as the winds swept howling along the street, they bore sharp streams of burning dust, and such sickening and poisonous vapors as took away, for the instant, breath and consciousness, followed by a tingling sensation of ag'ōny, trembling through every nerve and fi'ber of the frame.

9. The sea had retired far from the shore; and the people who had fled to it had been so terrified by the agitation and preternat'ural shrinking of the element, the gasping forms of the uncouth[2] sea-things which the waves had left upon the sand, and by the sound of the huge stones cast from the mountain into the deep, that they had retired again to the land, as presenting the less frightful aspect of the two.

10. A wild yell burst through the air! Thinking only of escape, whither it knew not, the terrible tiger of the desert leaped among the throng and hurried through its parted streams. And so came the earthquake—and so darkness once more fell over the earth!

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[1] **Appalling,** *ap-paul'ing.* [2] **Uncouth,** *un-kooth'.*

11. And meekly, softly, beautifully, dawned at last the light over the trembling deep!—the winds were sinking into rest—the foam died from the glowing azure of that now beautiful sea.

12. Around the east, thin mists caught gradually the rosy hues that her'alded the morning. Light was about to resume her reign.

13. Yet, still, dark and massive in the distance, lay the broken fragments of the destroying cloud, from which red streaks, burning dimlier and dimlier, betrayed the yet rolling fires of the mountain of the "Scorched Fields."

14. The white walls and gleaming columns that had adorned the lovely coasts were no more. Sullen and dull were the shores so lately crested by the cities of Herculaneum and Pompeii.

BULWER.

SIR EDWARD BULWER LYTTON was a celebrated English writer, born in 1805. He was also a Member of Parliament and Rector of the University of Glasgow.

What is a volcano? Where are most volcanoes? Of what advantages are they? What celebrated volcano in Italy? Near what city is Vesuvius? In what year was its first recorded eruption? What two cities were destroyed and covered by that eruption?

With what were the sides and base of that volcano covered for many years previous to the eruption? Describe the streets.

With what were these cities covered? How were they discovered?

What celebrated volcano in South America? *Cotopaxi.* Iceland? *Hecla.* Sicily? *Etna.*

What substance used in the manufacture of gunpowder is obtained in the craters of some volcanoes?

What are made of hardened lava?

What is pum'ice stone?

Each pupil may write a letter or composition about volcanoes, and give in his or her own language a short description of the destruction of the city of Pompeii.

XVI. MOUNTAINS; THEIR USES.

WERE it not for the great swells of land, the ridges and crests of rock, the wrinkles, curves, and writhings of the strata, how could springs of water be formed? What drainage could a country have? How could the rains be hoarded in fountains and lakes? Where would be the store-houses of the snow and hail?

2. "Every fountain and river, from the inch-deep streamlet that crosses the village lane in trembling clearness, to the massy and silent march of the everlasting multitude of waters in the Am'azon or the Ganges, owe their play and purity and power to the ordained elevations of the earth."

3. The richest beauty that invests the mountains suggests this branch of their utility. The mists that scale round them, above which their cones sometimes float, aerial[1] islands in a stagnant sea; the veils[2] of rain that trail along them; the crystal snow that makes the light twinkle and dance; the sombre thunder-heads that invest them with Sinai[3]-like awe, are all connected with their mission as the hydraulic[4] distrib'utors of the world,—the mighty troughs that apportion to the land the moisture which the noiseless

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[1] **Aerial,** *ā-ē're-al,* belonging to the air.

[2] **Veil,** *vāle.*

[3] **Sinai,** *si'nā-i,* a mountain mentioned in Scripture. It is situated in Asia, near the head of the Red Sea.

[4] **Hydraulic,** *hi-drau'lik,* relating to water-pipes.

so lar suction is ever lifting from the sea. Their peaks are the cradles, their furrows the first playground of the great rivers of the earth.

4. It is an equally obvious truth that mountain chains diversify climates. By their condensing effect upon the wet sea-winds, they make some districts more moist than others, and so va'riegate fertilities and the products of vegetation. One side of a mountain ridge receives much more rain than the other. For days together the valley of the Po[1] is never clouded, because the Alps, shrouded in dense fogs, are drawing off the waters from the wet lands before they reach the Italian plains. And the Himalayas[2] force the summer monsoons[3] to bring out their bounty so thoroughly upon their southern sides, that the steppes[4] of inland Asia suffer to compensate[5] for the beauteous rivers and rich vegetation of the Indian peninsula.[6] The Pacific shore under the Andes[7] is very dry and comparatively barren, because the trade-winds that blow across and enrich the countries of the Amazon from the Atlantic, are robbed of most of their bounty in scaling those cold summits from the east, and have little to disburse

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[1] **Po**, the largest river in Italy.

[2] **Himalaya**, *him-ä-lay'ä*, mountains in Asia, the highest in the world.

[3] **Mon-soons'**, winds of Southern Asia which blow from S. W in summer, and from N. E. in winter.

[4] **Steppes**, *steps*, vast plains of Russia and Siberia.

[5] **Com-pen'sate**, to repay, reward, or rec'ompense.

[6] **Peninsula**, *pen-in'su-lah*, a portion of land almost surrounded by water. Hindoostan' is called the India Peninsula.

[7] **Andes**, *an'deez*, a chain of mountains in South America.

upon the western slopes. We are told that if a mountain system could be upheaved in Sahara, the hot breezes that now sweep over it would be chilled and compelled to disgorge their booty,—so that the wilderness, sprinkled with rain and veined with rivers, would in time "blossom as the rose." As to our supply of water and our irrigation, we must, with David, "lift up our eyes to the hills, from whence cometh our help."

KING.

THOMAS STARR KING, an American clergyman and lecturer, was born in New York in 1824.

THE EARTHQUAKE IN SCIO.

IN the afternoon a terrific shock was felt, bringing three-fourths of the houses in the town to the ground like so many packs of cards, and burying thousands of persons under the falling ruins. Then commenced a fearful scene of horror. The ground rocked and danced, kneading the ruin already formed into a mass of stone.

2. The survivors ran hither and thither, not knowing where to flee to escape the horrible fate that menaced them, and were tossed and flung about by the heaving earth, like feathers in a breeze.

3. On every side the rumblings of the earth, the noise of falling buildings, the tearing asunder of the walls of houses, and the shrieks of the wounded, lent a fearful horror to the scene. All sought to leave the town and get into the plains, in order to avoid

Scio, before this earthquake, which occurred in 1881, was a rich and beautiful island belonging to Turkey, west of Asia Minor.

being buried under the falling buildings, but even those who gained the open country were by no means safe.

4. The earthquake attacked not only the towns and villages, but worked its ravages in the hills and mountains of the island. Enormous masses of rock and earth came rushing down the hillsides, carrying all before them, bounding far over the plains, and tearing roads in the solid mountain such as might have been formed by a torrent a thousand years old.

5. Great fissures and crevices yawned in the streets, walls were falling with a crashing report, and entire buildings crumbled to the ground. Mosques, min'arets, and the government palace became tottering ruins. In many places whole streets had disappeared. No one knew where to look for family or friends. The ground still heaved and tossed, bringing fresh buildings to the ground at every moment.

6. Parents wandered from place to place seeking their children and endeavoring to persuade themselves that their darlings would be found among the living. In an instant an entire village, built on the side of a hill, broke bodily away from the parent rock, and rushed crashing down into the plain.

7. The scene is sickening. Here a hand makes feeble signs through a crev'ice, while the unfortunate wretch to whom it belongs is buried beneath tons of masonry. There a voice calls for aid from underground. A daughter sobbing endeavors to encourage her father, who is imprisoned deep below the surface ; and at every turn of the spade or pick some horribly mutilated corpse is brought to light.

Blackboard Drawing. American Eagle. Height, 3 feet; width of outspread wings, 8 feet.

XVII. ABOUT BIRDS.

1. Here is a bird which can rise in the air as high as any balloon, and can steer itself so as to go whither it wishes, which is more than the man in the balloon can do. For this purpose it is contrived with wonderful wisdom. Numberless air-cells are distributed throughout its body, extending even into its bones. These air-cells the bird can fill at pleasure, and thus rise more easily in the air, or it can empty them and make itself heavier, so as to descend more rapidly upon its prey. Its feathers are models of strength and lightness. It is an American eagle.

2. The EAGLE is a bird of prey—that is, it procures its food by violence or robbery, seizing not only other birds but also young fawns, raccoons, rabbits, wild turkeys, etc. Its height or

length is about three feet. Some eagles have been known to live more than a hundred years.

3. The EAGLE is noted for its great strength and endurance, and it has been accepted as an emblem of the United States, also of Prussia, Austria, and other great nations.

4. Although eagles have been reported to be very fierce, and as having carried off young children, yet they have not always shown as much bravery and courage as some smaller birds.

5. On account of the eagle's cowardice and tyranny Benjamin Franklin lamented that it should have been selected as the emblem of this country.

6. The young eagles, called eaglets, are driven from their eyrie (*a're*), or nest, by the old ones, so soon as they are able to provide for themselves.

Head and Bill of Humming-Bird, 1 inch long; of Eagle, 10 inches; of Condor, 10 inches—all to be drawn on the blackboard full size.

7. The largest bird of flight is the CONDOR, which has its home in the **Andes Mountains**. It lives in the highest and loneliest places, and, like the eagle, it is a bird of prey. Two of

them, driven by hunger, do not hesitate to attack a horse, or a bull, or other large animal, which they tear to pieces with their strong, sharp beaks and talons (claws); and when they have killed it they so gorge themselves with its flesh that they are unable to fly. Men who wish to capture them take advantage of this greediness, and leave the dead body of a horse or other animal on the field until the condor has eaten so much as to become helpless. Its height is about four feet.

Blackboard Drawing. Barn Owl. Height 15 inches.

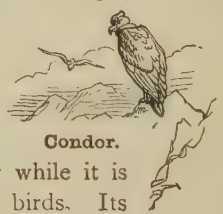
8. Humboldt, a celebrated German naturalist and traveller, once noticed a condor flying over the summit of **Chimborazo** (*Chim-bo-rah'zo*), a mountain in South America more than four miles high. Humboldt made very important explorations in the Old World, also in **Mexico**, the **West Indies**, the **United States of Colombia, Ecuador,** and **Peru.**

9. The Owl is remarkable for its large, round eyes, feathered ears, and fear of daylight. It flies about and seeks its food in the night-time, de-

vouring mice, birds, moles, young rabbits, etc. It builds in caves, old walls, towers, etc. There are more than a hundred species.

10. The OSPREY, or FISH-HAWK, is said to be able to carry a fish of its own weight, but the eagle, when he sees the osprey carrying off a fish, pounces upon him, and, forcing him to let go, swoops down with wonderful swiftness, catching the falling fish before it can touch the water.

11. The birds of prey include the eagle, condor, vulture, falcon (*faw'kn*), hawk, and owl. Their characteristics are strength, hooked bill, strong, sharp talons, fierce look, and keen scent.



Condor.

12. The FALCON obtains its prey while it is flying. It is trained to capture other birds. Its home is in Europe and America.

13. Birds vary in size, from the huge condor, that has a body four feet long, and wings which sometimes spread out fourteen feet in width, to the little humming-bird, which is not much larger than a big beetle.

14. The HUMMING-BIRD is small and very beautiful. It is remarkable for its long bill, which reaches honey and insects inside of flowers, for its feathers of rich green, red, purple, and brown, and for the quick motions of its wings, which cause the humming sound. Like

most other beautiful birds, they are more numerous in **Brazil** and other warm countries of **South America** than in the **United States.** There are about four hundred species of humming-birds.

15. Audubon, the celebrated American ornithologist, in describing the humming-bird, called it the "glittering fragment of the rainbow."

16. There is a bird that knows how to sew, and is therefore called the tailor-bird. He sews leaves together and thus forms his nest. Others take long grass or any other fibrous material, and weave it into a kind of coarse cloth, of which they make their nests.

Blackboard drawing of Baltimore Oriole. Full length of bird, 7½ inches.

17. We have one of these weaver-birds in our country. It is called the BALTIMORE ORIOLE, a beautiful bird covered with orange and black feathers.

18. This nest, as you see, (referring to the drawing on the blackboard), is not only strongly woven together,

but kept from swaying too violently in the wind by cords that brace it in different directions.

19. The Baltimore oriole spends the winter in Mexico, Central America, and the West Indies, and returns north in the spring, flying all day and resting at night. It is known as far north as the New England States, and is sometimes called the "fire-bird," from its color, also "hang-bird" and "golden robin."

20. Some birds are good plasterers, and fix their nests with mud or clay very neatly and securely in any favorable place. Some are so skilful as to make them adhere securely to the smooth surface of glass.

21. Our common CHIMNEY-SWALLOW is a very good plasterer.

22. He has, besides, a very curious arrangement in his head. There are two glands or bags in the back part of it, which are filled with liquid glue. After he has made a shelf of mud or clay he makes his nest of tender twigs, interlacing them and joining their ends smoothly together by means of this liquid glue, so that no rough ends may stick out on the inside. After being lined with feathers or any other soft material and securely plastered around on the outside, it is ready for the eggs.

23. Cuvier was one of the greatest naturalists that ever lived. His attention was first called to this study by some of these plasterers. When quite a young man he went one summer to spend his vacation in a little place near the sea. Just outside of his window two swallows had built their nest. One day a strange bird came and took possession of the nest, opposing its sharp beak to the

mother-bird when she came home. She and her mate chattered together for some time, and then flew away.

24. They came back soon, however, with a great many others. They chattered together for a little while, and then flew away again.

25. Presently they all reappeared, flying in a long file, one after the other, each bearing some mud in its claws. They flew close to the nest, where sat the strange bird in impudent security, and, as they passed, each threw the mud he carried directly into the face of the intruder, which was thus killed and buried in the very place of his crime—the nest he had stolen.

26. From that moment Cuvier devoted himself to the study of birds, fishes, insects, quadrupeds, and other animals, and became distinguished for his knowledge of natural history.

27. There are other birds which may be called miners, for they dig holes in the earth and make their nests at the end of these holes.

28. Such are the SAND MARTINS, which dig in a dry sand-bank horizontal galleries, at the ends of which they have their comfortable nests. They fly about in small flocks, and seem to make very pleasant and sociable little communities.

29. These things show that birds, though their heads are small, must have brains.

30. It is said by some naturalists that the CANARY-BIRD has a larger brain in proportion to the size of its body than any other living creature; however, it is wonderful to see these bright little birds, after only a fortnight's training, act before an audience, fight mimic battles and duels, fire cannons, fall down as if shot, and, feigning death, be carried off by their companions with astonishing composure.

Cormorant, length 3 feet; Toucan, 17 inches long, its bill, 9 inches; Bird-of-Paradise, head and body together, 12 inches in length; its tail-feathers, 24 inches. Draw full size.

31. The birds trained by the Chinese to catch fish for their masters are called CORMORANTS.

32. Like the duck, goose, and swan, the cormorant has webbed feet and short legs. He is a very expert diver and swimmer, making use not only of his feet but also of his wings under the water.

33. The TOUCAN (*too'kan*) is remarkable for its large orange-red bill, which is more than half as long as its body.

34. The feathers of its back and wings are mostly black, and of its throat, white. It builds in the holes of trees, and feeds on fruits, small birds, reptiles, and insects.

35. Unlike eagles and condors, which live in pairs, the toucans live in flocks.

36. They are numerous in **Brazil** and other warm parts of South America.

37. The BIRD-OF-PARADISE, from which long, beautiful feathers of brilliant colors—green,

yellow, red, and purple—are obtained for ladies' hats, is a native of the island of **Papua** (*pap'-oo-a*), or **New Guinea.** It is found also on **Celebes** (*sel'e-bees*), the **Philippine** (*fil'ip-pin*), and other islands southeast of Asia. It is about as large as a pigeon, and feeds on seeds, grasshoppers, etc.

38. Other birds which are remarkable for the length and beauty of their tails are the LYRE-BIRD of Australia and the TROGAN of the Torrid Zone.

39. The rapidity with which birds can move through the air is astonishing. Few persons have any idea of the force expended in the action of flight.

Birds building a nest.

40. Some birds fly so rapidly that the strokes of the wing cannot be counted. The wings of the humming-bird when in motion cannot even be seen.

41. Let any one try to count the strokes of the wing of a pigeon or of the diving sea-fowl, and he will find that it is utterly impossible.

42. Still more astonishing is the wonderful power possessed by some birds of finding their way through the pathless air, with no apparent means of guiding their course. This has been turned to account by man in the case of the CARRIER-PIGEONS, which are used in carrying letters to distant places.

43. When Paris was besieged by the Germans in 1870, a great many letters were carried to and fro by these birds.

44. Their general rate of flight does not usually exceed thirty miles per hour.

45. Some carrier-pigeons were let loose at Scranton, in Pennsylvania, in 1878, and they alighted on the coop of their owner in the city of New York, after flying a distance of one hundred and six miles, in about three hours.

46. PIGEON-HAWKS must, of course, fly faster than pigeons so as to catch them, and they are sometimes trained for that purpose, so that the letters carried by the carrier-pigeons may come into the possession of those for whom they were not intended.

47. Some birds, on the other hand, cannot fly at all. In this case their bones are as solid as ours. One of these, the OSTRICH, is the tallest of living birds, being sometimes eight to ten feet high, and weighing from fifty to one hundred pounds.

Ostriches.

48. They furnish us with very beautiful feathers. These are so valuable that men have

caught and tamed the ostriches, and you may now see in **South Africa** ostrich farms where these birds are reared.

49. There is an ostrich found in South America, but it is smaller than the African ostrich. It is called the RHEA. Its feathers are so much less beautiful that, in place of adorning the heads of our ladies, they are made into feather dusters.

50. During the day the heat of the sun aids in hatching the eggs of the African ostrich, but at night the male bird sits on the nest so as to protect the eggs from all assaults, and if attacked by a wild animal it will kill it by a kick. One of these eggs will weigh from two to three pounds, and is equal to about twenty-four such eggs as you sometimes have for breakfast.

51. The CAS'SO-WA-RY of Eastern Asia and the E'MU of Australia resemble the ostrich very much, but are not so large. They are very swift runners. The ostrich when pursued runs about thirty miles an hour, and is only captured by Arabs on swift horses after a chase of several hours.

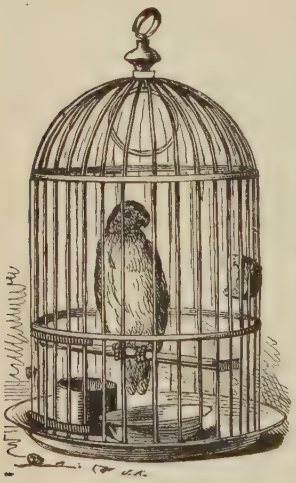
52. Some eagles, hawks, and crows are so cunning as to have found out that a turtle or a clam, no matter how closely shut up, may be opened by being carried up high into the air and then let fall upon a rock.

53. The MOUND-BIRDS, that live in Australia, are cunning enough to have found out that fermenting vegetable matter gives out heat enough to hatch eggs; so, after scraping up grass and weeds in their claws, they throw them together so as to make a huge heap or mound,

sometimes seven feet high and twenty feet across. The heat of the interior of this is said to reach sometimes ninety-five degrees.

54. In this mound the birds make holes, in which they deposit their eggs, and leave them there to be hatched out by this internal heat.

55. Our domestic fowls, as well as many other birds, supply us with food. Others supply us with feathers for our pillows; others give us pens to write with. In some places men train hawks to catch other birds for them, and some large hawks are trained to kill even gazelles and small deer.



Parrot.

56. Birds also give men much amusement by the various tricks they are taught. Parrots and some other birds can be taught to pronounce words, and can be made to repeat whole sentences so naturally as to startle and surprise those people who hear them.

57. Birds are very useful to us, not only for food and their beautiful feathers, but also for destroying insects which would do great damage to trees and plants. They also devour snakes, lizards, etc.

58. The SERPENT BIRD of Africa will attack a large snake, making use of one of his strong wings as a shield and of the other as a weapon, with which he inflicts blow after blow until the reptile is overcome.

Blackboard Drawing: White Pelican; full length, 5 feet; bill, 14 inches long; pouch, 7 inches deep. Woodpecker; full length, 15 inches.

59. The WOODPECKER appears to have a hard life when compared with that of birds which easily find their food on the ground, in the water, or among the leaves of the trees; for the worms and insects upon which he lives are hidden away in the trunks of trees. To get them he must tear away the bark and perhaps bore or drill deep holes in the hard wood. This he does with his long, strong bill, much faster than any of you could do it with a sharp knife.

60. The Woodpecker runs up and around the trunk of a tree, tapping with his bill as he goes, and when he hears a hollow sound, he knows a worm is there.

61. Some Woodpeckers also bore large holes in trees in which to build their nests.

62. The PELICAN is remarkable for the great pouch or sack which is under its long bill and

Blackboard Drawing: Heron; full height, 3½ feet.

which serves as a kind of scoop-net. This pouch will hold fish sufficient for the dinner of six men.

63. Pelicans are expert fishers. A number of them will surround a shoal of fishes and, gradually swimming closer together, drive them into shallow water, where they devour them in large quantities. Having webbed feet, they are excellent swimmers.

64. They feed their young with food which they had swallowed, and which they have the power of raising to their bills.

65. Pelicans are found in Florida, California and other parts of North America; also in Asia, Africa and Southeastern Europe. Some are white, and others brown.

66. Another excellent fisher is the HERON. It is remarkable for its long, curved neck, long bill, and long, straight legs, which are admirably adapted to its mode of life. Its feet are not webbed and, consequently, it is not a swimmer.

67. Its home is near swamps. Its food consists of fish, frogs, etc., which it catches by watching in dark, lonely spots. In this respect it differs from the Pelican, Gull, Petrel and Ibis, which are very active.

68. Another very tall bird similar in shape to the Heron is the RED FLAMINGO. It is a swimmer and wader. With its webbed feet it digs in the mud for worms, insects, and small fishes.

69. It is found in the marshes, lakes, and rivers of Asia, Africa, and the warm parts of Europe. It is about as tall as a man.

70. The WHITE STORK is also a long-legged wader. It is noted for its intelligence and is very observing, readily judging of the feelings entertained toward it by the people on whose house-tops or chimney-tops it wishes to build its great, rough nest.

71. In **Holland** and **Germany**, which Storks visit every year, some of these birds become very tame and play with the children in the streets. Their feet are not webbed. Are Storks swimmers? You will observe that all birds which have webbed feed are good swimmers, but very clumsy walkers, as the Goose, Swan and Duck.

72. When the time arrives for Storks to leave their nests and migrate, they have been known to kill their sick; but, on the other hand, they are generally kind to each other, and the young have been noticed to watch anxiously over the aged and helpless of their kind, bringing them food and otherwise tenderly caring for them.

73. The Stork passes the winter in **Egypt**, where, like the VULTURE, another large bird, it feeds on garbage, carrion and other such substances, thus preventing the spread of disease among the people who are too indolent to cleanse their streets. It is about as tall as a boy nine years of age—four feet.

74. The CRANE is another long-necked, long-legged bird, very active, graceful, and intelligent. Like the Stork, it spends its winters in Egypt and other warm countries and its summers further north. Its food is fish, frogs, and vegetables.

75. The SWAN, which has a long neck and short legs, is considered the most graceful of swimmers. Both father and mother carry their young on their backs and shelter them under their wings; and, should the safety of their brood be threatened, they do not hesitate to attack man, horse, fox, dog, or any other aggressor.

Blackboard Drawing: Kingfisher; length, 12 inches.

76. Swans belong to Europe, Asia and North America; their food consists chiefly of the roots and bulbs of water plants. It is said that some Swans live as long as an Elephant—one hundred years.

77. The KINGFISHER, like the Gull, pounces upon its prey at the surface of the water; but unlike it, it sits alone on a branch which overhangs the water, while the Gull and the Stormy Petrel skim rapidly and almost unceasingly over the water in search of their food.

Blackboard Drawing: Snipe and Common Quail; height of each about 9 inches.

78. The SNIPE, a much smaller bird than the Heron, has long legs and a long, slender bill, which are admirably adapted to procuring its food—insects and worms on coasts and marshes.

79. The Snipe belongs chiefly to North America and Europe. Included in this family are the WOODCOCK and PLOVER, which are highly prized by sportsmen. The PENGUIN of the Antarctic Regions, and the PUFFIN and AUK of the Arctic Regions sit upright when on shore.

80. The QUAIL has a short bill and feeds on grain, seeds, berries and insects, which it finds on the ground. It flies low and only when startled lights upon trees.

81. Quails pass the night on the ground, all huddled together in a circle, with their heads outward, the better to listen and fly if danger approaches.

82. Similar to the Quail are the Partridge, Pheasant, and Grouse; indeed, these names are sometimes applied indiscriminately to the same kind of bird.

XVIII. RAMBLES AMONG BIRDS.

I. Warning Notes—The Heron.

EDWARD[1] had entered a narrow glen. He was listening to the voice of the cuckoo, and the *clap-clap* of the ring-pigeons, which rose in great numbers, when an abrupt turn of the road brought him, suddenly and unexpectedly, within a few yards of a beautiful her'on.

2. "I immediately stood still," he says. "The upright and motionless attitude of the bird indicated plainly that he had been taken by surprise; and for the moment he seemed, as it were, stunned and incapable of flight. There he remained, as if fastened to the spot, his bright yellow eye staring me full in the face, and with an expression that seemed to inquire what right I had to intrude into solitudes where the human form is so rarely seen.

3. "As we were thus gazing at each other, in mutual surprise at having met in such a place, I observed his long slender neck quietly and gradually doubling down upon his breast. His dark and lengthened plumes were at the same time slightly shaken.

4. "I knew by this that he was about to rise; another moment, and he was up. Stretching his long legs behind him, he uttered a scream so dismal, wild, and loud that the very glen and hills re-echoed the sound, and the whole scene was instantly filled with clamor.

[1] A Scotch Naturalist.

5. "The sandpiper screamed its *kittie-needie;* the pigeon *cooed;* the pip'it, with lively emotion, came flying round me, uttering all the while its *peeping* note; the meadow-hen sprung up with whirring wing from her heath lair, and gave forth her well-known and indignant *birr birr-bick;* the curlew came sailing down the glen with steady flight, and added to the noise with his shrill and peculiar notes of *poo-elie poo-elie coorlie coorlie wha-up;* and, from the loftier parts of the hills, the plovers ceased not their mournful wail, which accorded so well with the scene of which I alone appeared to be a silent spectator.

6. "I moved not a foot until the alarmed inmates of the glen and the mountain had disappeared, and solemn stillness had again resumed its sway."

II. Affection of Birds—The Wild Duck.

N the following day, I observed a cur'lew rise from a marshy part of the hill, to which I bent my steps in hopes of finding her nest.

2. In this, however, I was disappointed; but I came upon a wild duck lying beside a tuft of rushes.

3. It may be mentioned that there had been a heavy snow-storm, which had forced the plovers and wild ducks to abandon their nests, though then full of eggs.

4. As I imagined she was skulking with a view to avoid observation, I touched her with my stick, in order that she might rise; but she rose not.

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[1] **Sand'pi-per**, a wading bird resembling a snipe.

5. I was surprised, and on a nearer inspection I found that she was dead. She lay raised a little on one side, her neck stretched out, her mouth open and full of snow, her wings somewhat extended, and with one of her legs appearing a little behind her.

6. Near to it there were two eggs. On my discovering this, I lifted up the bird, and underneath her was a nest containing eleven eggs; these, with the two others, made thirteen in all: a few of them were broken.

7. I examined the whole of them, and found them, without exception, to contain young birds. This was an undoubted proof that the poor mother had sat upon them from two to three weeks. With her dead body in my hand, I sat down to investigate the matter, and to ascertain, if I could, the cause of her death.

8. I examined her minutely all over, and could find neither wound nor any mark whatever of violence. She had every appearance of having died of suffocation. Although I had only circumstantial evidence, I had no hesitation in arriving at the conclusion that she had come by her death in a desperate but faithful struggle to protect her eggs from the fatal effects of the recent snow-storm.

9. I could not help thinking, as I looked at her, how deep and striking an example she afforded of maternal affection. The ruthless blast had swept with all its fury along the lonesome and unsheltered hill. The snow had risen higher, and the smothering drift came fiercer, as night drew on; yet still that poor bird, in defiance of the warring elements, con-

tinued to protect her home and the treasure which it contained, until she could do so no longer, and yielded up her life. That life she could easily have saved, had she been willing to abandon the offspring which nature had taught her so fervently to cherish, and in endeavoring to preserve which she voluntarily remained and died.

10. Occupied with such feelings and reflections as these, I know not how long I might have sat, had I not been roused from my rev'erie by the barking of a shepherd's dog.

11. The sun had already set, the gray twilight had begun to hide the distant mountains from my sight, and not caring to be benighted on such a spot, I wrapped a piece of paper, as a winding-sheet, round the faithful and devoted bird, and digging a little grave, I laid into it the mother and the eggs.

12. I covered them with earth and moss, and over all placed a solid piece of turf. Having done so, and being more affected than I should perhaps be willing to acknowledge, I left them to molder into their original dust, and went on my way.

III. Bravery of Birds—Terns.

HAVING thus related an instance of maternal affection on the part of the wild duck, let us cite a still more remarkable instance of brotherly sympathy and help on the part of the common tern,[1] or sea swallow.

2. "Being on the sands one afternoon at the end of August, I observed several parties of terns busily employed in fishing. As I was in want of a specimen of this bird, I loitered about on the beach narrowly watching their motions.

3. "The scene around was of no common beauty. In the azure heaven not a cloud was to be seen, as far as the eye could reach; not a breath of wind was stirring the placid bosom of the firth. The atmosphere seemed a sea, as it were, of living things; so numerous were the insects that hummed and fluttered to and fro in all directions. The sun, approaching the verge of the horizon, shot long and glimmering bands of green and gold across the broad mirror of the deep. Here and there several vessels were lying becalmed, their whitened sails showing brightly in the goldened light.

4. "An additional interest was imparted by the herring-boats which were congregating in the bay, their loose and flagging sails, the noise of the oars, and the efforts of the rowers, told plainly enough that a hard pull would have to be undergone before they could reach their particular quarters for fishing.

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[1] Tern, an aquatic fowl resembling a gull.

5. "While I stood surveying with delight the extended and glorious prospect, and witnessing with admiration the indefat'igable evolutions of the terns in their search for food, I observed one of them break off from a party of five, and direct his course toward the shore, fishing all the way as he came.

6. "It was an in'teresting sight to behold him as he approached in his flight—at one moment rising, at another descending—now poised in mid-air, his wings expanded but motionless, his piercing eye directed to the water beneath, and watching with eager gaze the movements of its scaly inhabitants —and now, as one of them would ever and anon come sufficiently near the surface, making his attack upon the fish in the manner so thoroughly taught him by nature.

7. "Quick as thought, he closed to his side his outspread pinions; turned off his equilib'rium with a movement almost imperceptible; and, with a seeming carelessness, threw himself headlong into the deep so rapidly that the eye could with difficulty keep pace with his descent.

8. "In the least space of time he would be seen sitting on the water, swallowing his prey. This being accomplished he again mounted into the air. He halts in his progress. Something has caught his eye. He lets himself down; but it is only for a little, for his expected prey has vanished from his sight.

9. "Once more he soars aloft on lively wing; and having attained a certain elevation, and hovering for a little, with quick-repeated strokes of his pinions he rapidly descends.

10. "Again, however, his hoped-for victim has made its escape · and he bounds away in an oblique[1] direction, describing a beautiful curve as he rises without having touched the water.

11. "Shortly after, he wings his way nearer and nearer to the beach; onward he advances with zig-zag flight, when suddenly, as if struck down by an unseen hand, he drops into the water within about thirty yards of the place where I am standing.

12. "As he righted and sat on the bosom of the deep, I was enabled distinctly to perceive that he held in his bill a little scaly captive, which he had snatched from its home, and which struggled violently to regain its liberty. Its struggles were in vain; a few squeezes from the mandibles[2] of the bird put an end to its existence.

13. "Being now within my reach, I stood prepared for the moment when he should again arise. This he did so soon as the fish was dispatched. I fired, and he came down with a broken wing, screaming as he fell into the water. The report of the gun, together with his cries, brought together the party he had left, in order that they might ascertain the cause of the alarm.

14. "After surveying their wounded brother round and round, as he was drifting unwittingly toward the shore with the flowing tide, they came flying in a body to the spot where I stood, and rent the air with their screams.

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[1] **Oblique**, *ob-leek'*, **slanting.**

[2] **Man'di-bles**, **jaws.**

15. "These they continued to utter, regardless of their own individual safety, until I began to make preparations for receiving the approaching bird.

16. "I could already see that it was a beautiful adult specimen; and I expected in a few moments to have it in my possession, being not very far from the water's edge.

17. "While matters were in this position, I beheld, to my utter astonishment and surprise, two of the unwounded terns take hold of their disabled comrade, one at each wing, lift him out of the water, and bear him out seaward. They were followed by two other birds.

18. "After being carried about six or seven yards, he was let gently down again, when he was taken up in a similar manner by the two which had been hitherto inactive.

19. "In this way they continued to carry him alternately, until they had conveyed him to a rock at a considerable distance, upon which they landed him in safety.

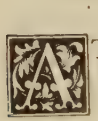
20. "Having recovered my self-possession, I made toward the rock, wishing to obtain the prize which had been so unceremoniously snatched from my grasp. I was observed, however, by the terns; and instead of four, I had in a short time a whole flock about me.

21. "On my near approach to the rock, I once more beheld two of them take hold of the wounded bird as they had done already, and bear him out to sea in triumph, far beyond my reach. This, had I been so inclined, I could no doubt have prevented.

22. "Under the circumstances, however, my feelings would not permit me; and I willingly allowed them to perform without molestation an act of mercy, and to exhibit an instance of affection, which man himself need not be ashamed to imitate.

23. "I was, indeed, rejoiced at the disappointment which they had occasioned, for they had thereby rendered me the witness of a scene which I could scarcely have believed, and which no length of time will efface from my recollection."

IV. Perseverance of Birds—The Turn-Stone.

"  T length I came in sight of the two little workers, which were busily endeavoring to turn over a dead fish which was fully six times their size.

2. "I immediately recognized them as turn-stones. Not wishing to disturb them, and anxious at the same time to witness their operations, I observed that a few paces nearer them there was a deep hollow among the shingle, which I contrived to creep into unobserved.

3. "Having got fairly settled down, I turned my undivided attention to the birds before me. They were boldly pushing at the fish with their bills, and then with their breasts. Their endeavors, however, were in vain: the object remained immovable. On seeing this, they both went round to the opposite side, and began to scrape away the sand from beneath the fish.

4. "After removing a considerable quantity, they again came back to the spot which they had left, and went once more to work with their bills and breasts, but with as little apparent success as formerly.

5. "Nothing daunted, however, they ran round a second time to the other side, and recommenced their trenching operations with a seeming determination not to be baffled in their object, which evidently was to undermine the dead animal before them, in order that it might be the more easily overturned.

6. "While they were thus employed, and after they had labored in this manner at both sides alternately for nearly half an hour, they were joined by another of their own species, which came flying with rapidity from the neighboring rocks.

7. "Its timely arrival was hailed with evident signs of joy. I was led to this conclusion from the gestures which they exhibited, and from a low but pleasant murmuring noise to which they gave utterance so soon as the new-comer made his appearance.

8. "Of their feelings he seemed to be perfectly aware, and he made his reply to them in a similar strain. Their mutual congratulations being over, they all three set to work; and after laboring vigorously for a few minutes in removing the sand, they came round to the other side, and putting their breasts simultaneously to the fish, they succeeded in raising it some inches from the sand, but were unable to turn it over. It went down again into its sandy bed, to the manifest disappointment of the three.

9. "Resting, however, for a while, and without leaving their respective positions, which were a little apart the one from the other, they resolved, it appears, to give the work another trial.

10. "Lowering themselves, with their breasts close to the sand, they managed to push their bills underneath the fish, which they made to rise to about the same height as before.

11. "Afterward, withdrawing their bills, but without losing the advantage which they had gained, they applied their breasts to the object. This they did with such force and to such purpose that at length it went over and rolled several yards down a slight declivity.

12. "It was followed to some distance by the birds themselves, before they could recover their bearing.

13. "I was so pleased, and even delighted, with the sagacity and perseverance which they had shown that I should have considered myself guilty of a crime had I taken away the lives of these interesting beings at the very moment when they were exercising, in a manner so happily for themselves, the wonderful instincts implanted in them by their Creator."

THOMAS EDWARD, the Scotch Naturalist, whose life has been written by Samuel Smiles, was born in 1814. He lived in Aberdeen, in the northern part of Scotland, where he pursued his love of nature surrounded by difficulties and troubles—not the least of which was that of domestic poverty. Having to work hard as a shoemaker, to support his family, he spent most of his nights out-of-doors, amidst damp, and wet, and cold, in search of knowledge. Many men thought him mad for undergoing such privations. In 1866, he was elected an Associate of the Linnæan Society—one of the highest honors that science could confer upon him.

NOTES ON BIRDS.

1. Birds are great travelers. Many, after they have brought up their young to take care of themselves, undertake voyages which are sometimes very long. They are guided by an instinct which we find it difficult to understand, and they never lose their way.

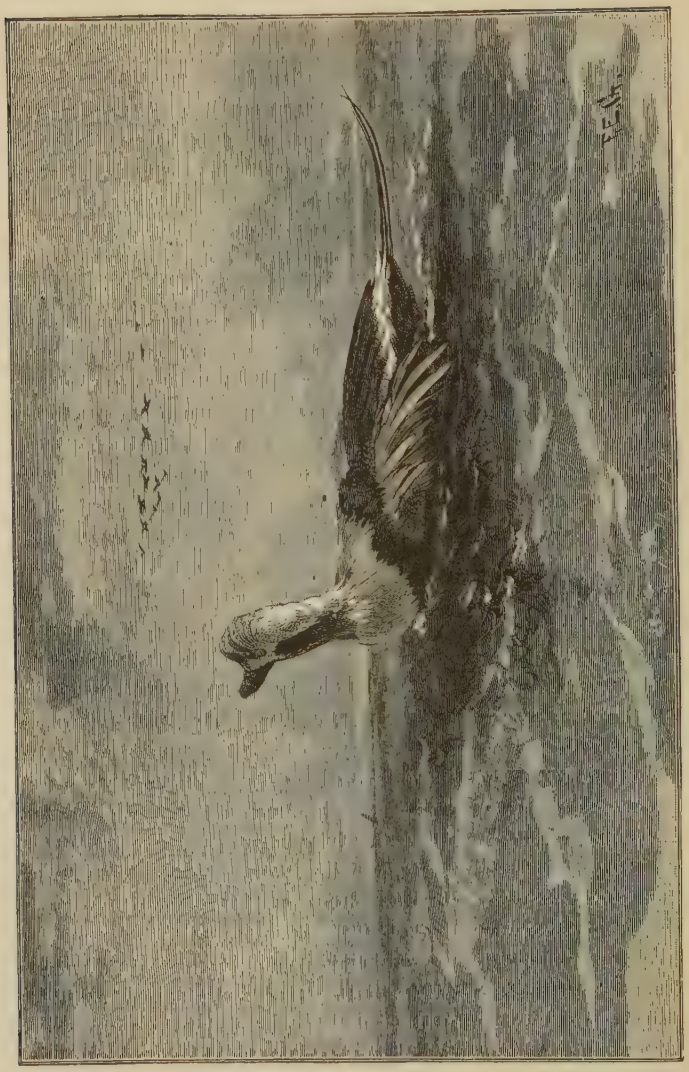
2. In this, the North Temperate Zone, they set out every autumn about the same date, always in the same direction, and their return is one of the welcome signs of spring.

3. Some fly in pairs, and others in flocks; some by day, others by night; some high in air, descending only occasionally and for short periods, while others less able to endure long flights make their way from tree to tree and from forest to forest. Aquatic birds make their way partly by flying and partly by swimming.

4. More than half the birds of North America fly to the Southern States, Mexico, West Indies, or Brazil, where they pass the winter.

5. Birds are almost everywhere,—in the frozen as well as the temperate zones, and in the tropical forests; on plain and prairie, desert and marsh; on hill and in valley; on mountain and cliff; in the brightest sunshine and in the darkest cavern. They inhabit the air, land, and water.

6. Some never fly, while others seem never to cease flying; some are always on the ground, while others are never seen to touch it; some are so active that their wings cannot be seen when in rapid motion, while others stand or sit in solitude as motionless as a stone. All, however, choose the place and pursue the course to which they are by nature adapted.



XIX. THE WATERFOWL.

WHITHER, midst falling dew,
While glow the heavens with the last steps of day,
Far, through their rosy depths, dost thou pursue
Thy solitary way?

Vainly the fowler's eye
Might mark thy distant flight to do thee wrong,
As, darkly seen against the crimson sky,
Thy figure floats along.

Seek'st thou the plashy brink
Of weedy lake, or marge of river wide,
Or where the rocking billows rise and sink
On the chafed ocean-side?

There is a power whose care
Teaches thy way along that pathless coast—
The desert and illim'itable air—
Lone wandering, but not lost.

All day thy wings have fanned,
At that far height, the cold, thin atmosphere,
Yet stoop not, weary, to the welcome land,
Though the dark night is near.

And soon that toil shall end;
Soon shalt thou find a summer-home, and rest,
And scream among thy fellows; reeds shall bend,
Soon, o'er thy sheltered rest.

Thou'rt gone, the abyss of heaven
Hath swallowed up thy form; yet, on my heart
Deeply has sunk the lesson thou hast given,
And shall not soon depart.

He who, from zone to zone,
Guides through the boundless sky thy certain flight,
In the long way that I must tread alone,
Will lead my steps aright.

BRYANT.

XX. ROBERT OF LINCOLN.

MERRILY swinging on brier and weed,
Near to the nest of his little dame,
Over the mountain-side or mead,
Robert of Lincoln is telling his name:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Snug and safe is that nest of ours,
Hidden among the summer flowers.
Chee, chee, chee.

Robert of Lincoln is gayly drest,
Wearing a bright black wedding-coat;
White are his shoulders and white his crest.
Hear him call in his merry note:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Look, what a nice new coat is mine,
Sure there was never a bird so fine.
Chee, chee, chee.

Robert of Lincoln's Quaker wife,
Pretty and quiet, with plain brown wings,
Passing at home a patient life,
Broods in the grass while her husband sings:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Brood, kind creature; you need not fear
Thieves and robbers while I am here.
Chee, chee, chee.

Modest and shy as a nun is she;
One weak chirp is her only note.
Braggart and prince of braggarts is he,
Pouring boasts from his little throat:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Never was I afraid of man;
Catch me, cowardly knaves, if you can!
Chee, chee, chee.

Six white eggs on a bed of hay,
Flecked with purple, a pretty sight!
There as the mother sits all day,
Robert is singing with all his might:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Nice good wife, that never goes out,
Keeping house while I frolic about.
Chee, chee, chee.

Soon as the little ones chip the shell,
Six wide mouths are open for food;
Robert of Lincoln bestirs him well,
Gathering seeds for the hungry brood.

Bob-o'-link, bob-o'-link,
Spink, spank, spink;
This new life is likely to be
Hard for a gay young fellow like me.
Chee, chee, chee.

Robert of Lincoln at length is made
Sober with work, and silent with care.
Off is his holiday garment laid,
Half forgotten that merry air:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Nobody knows but my mate and I
Where our nest and our nestlings lie.
Chee, chee, chee.

Summer wanes; the children are grown.
Fun and frolic no more he knows;
Robert of Lincoln's a humdrum crone;
Off he flies, and we sing as he goes;
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
When you can pipe that merry old strain,
Robert of Lincoln, come back again.
Chee, chee, chee.

BRYANT.

WILLIAM CULLEN BRYANT, a celebrated poet and editor, born in Massachusetts in 1794. He moved to the city of New York in 1825. His talent as a writer was remarkable at the eleventh year of his age, and throughout his life—which extended to a good old age. In his untiring industry, his nobleness of character, his modesty and purity, the example of his life is one which all young Americans should follow.

XXI. HOSPITALITY OF BIRDS.

ONE winter, when I lived in the country, I had a family of six tame, but uncaged birds; they were a strange-looking group, but, nevertheless, a very happy one.

2. There was a jackdaw, a magpie, two skylarks, a goldfinch, and a robin, and they lived when at home in a large and well-thatched ā'viary, which was placed in a very sheltered position. In this abode they kept open house, for there was always a good supply of food kept therein, and the door was never shut save at night, when we closed it to keep out stray cats, rats, and other enemies of the feathered race.

3. After partaking of a good breakfast, they would daily leave their comfortable house on expeditions of pleasure or business, and return regularly to their supper and perch.

4. During the very cold weather, they brought home nightly a party of hungry wild birds to share with themselves the hospitality of the aviary; sometimes their guests would number nearly two hundred, and it was really quite astonishing to see the quantity of bread, barley, and fat meat that these little beings would dispose of. Among the guests were golden-crested wrens, which were the first to reach and the last to quit their good quarters.

5. Whilst they honored us with their company, they ruled the whole bird community, aud what they could not achieve by force they would accomplish by stratagem.

6. For instance, if one of these tiny creatures took a fancy to a piece of meat to which Mr. Jackdaw had helped himself, and which he was holding firmly down with one foot whilst he pecked at it, this mite of a bird would jump upon the jackdaw's head, and attack the eye that was situated on the side of the occupied foot.

7. The poor jackdaw, not quite understanding what had gone wrong with him, would lift his foot to scratch away his tiny tormentor off his head, when in an instant the coveted morsel was seized by the daring thief.

8. If, after selecting a piece of meat, the wrens were left to themselves, they would leave the larger birds and retire to a quiet corner, where they would both peck amicably at the same piece, and if the meat happened to be tough, one of the wise little things would hold it fast in its bill, while the other would pull a morsel off; and then the one that had eaten would perform the same kind office for his friend.

XXII. SCATTER YOUR CRUMBS.

AMIDST the freezing sleet and snow,
The timid robin comes;
In pity drive him not away,
But scatter out your crumbs.

And leave your door upon the latch
For whosoever comes;
The poorer they, more welcome give,
And scatter out your crumbs.

All have to spare, none are too poor,
When want with winter comes;
The loaf is never all your own
Then scatter out your crumbs.

Soon winter falls upon your life,
The day of reckoning comes:
Against your sins, by high decree,
Are weighed those scattered crumbs.

THE EAGLE.

HE clasps the crag with crooked hands;
Close to the sun in lonely lands,
Ringed with the azure world, he stands.

The wrinkled sea beneath him crawls;
He watches from the mountain walls,
And like a thunder-bolt he falls.

XXIII. A NOBLE BOY AND HIS FAITHFUL BIRD.

THE island of Sardinia, situated in the Mediterranean Sea, contains mountains covered with fine trees, amid which are pleasant homes surrounded by flowers.

2. Children play with rabbits and martins on the mountain-side, where vines leap from tree to tree, forming festoons and natural arbors, in which birds build their nests and sing their songs.

3. Rivulets dash, dance, and sparkle on their way to the little lakes, on whose shores the orange ripens and grapes of unsurpassed richness cluster. When Rome was the Mistress of the World, Sardinia was called her grăn'ary.

4. In 1654, the hero of our story was born on this lovely island. A bright, proud, dark-eyed boy he grew, the very idol of his parents. He rowed on the ti'ny lake, chased the moufflon[1] on the mountain, and made the birds his friends. Two little sisters shared his love, and Francesco was a very happy boy, in a very happy home.

5. One night, when he was ten years old, he kissed his parents and went to his nice attic bed, and slept the sleep of a good boy to whom life has been all love and joy, with never a sorrow or care. Let us stop and look at that calm sleep: for so shall Francesco never sleep again!

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[1] **Moufflon**, *mōōf'lon*, a kind of sheep.

6. The midnight was made hideous by that cry of "Fire! Fire! Fire!" and he awoke to see, by a glare of light, his mother at his bedside with a little girl in either arm. Through crashing timbers, smoke and flames they made their way out.

7. Those flames rose high and higher, grew hot and hotter—now rolling up as a scrōll, now darting out in little tongues, and now sporting with each other in very wantonness of glee, while a huge column of smoke rolled up and shut out all the brightness of heaven. Fiercely the flames raged, fiercely the men fought them; and the father was foremost in the fight, until the dreadful fire leaped out and wrapped him in a death embrace.

8. The watching mother, with one loud shriek, fell. As friends clustered around to bring her back to conscious[1] life, they saw that her feet were fearfully burned. In bringing out her children, she must have trodden on live coals, but in her anxiety, have forgotten herself.

9. The sun on the morning after that happy evening—that awful night—rose calm and bright. It shone on the few charred[2] bones of the loving father; on the prostrate mother, whose feet, swift to save her darlings, took then their last step; on the smouldering embers of the nice home; on three poor little homeless orphans. It shone with not one gleam of sympathy in a single ray, and its very warmth and brightness made it seem cold and dark, and chilled Francesco's young, aching heart.

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[1] **Conscious,** *kon'shus.* [2] **Charred,** *tshärd.*

10. For a time friends cared for the family; but little was saved from the wreck of property, and often they suffered with hunger, and the mother was compelled to send her son to tell her friends. A cold look, an indifferent tone, was worse than hunger to him, yet for his mother and sisters he would brave even a frown.

11. One night, as he lay on his hard bed, the moonlight shining through his little window, asking himself, as he had often done, "What can I do?"—a thought of the birds he used to pet came to him, and a smile played on his lips, though his eyes were blurred with his lone weeping, and great tears trembled on his long, dark eyelashes.

12. In the morning he brought in some bits of wood and began to whittle. An assurance of coming independence was written all over his face, and he made the whole house cheery with the chirp of his musical whistle,[1] and his mother, in her chair, rejoiced to see her boy so happy.

13. "These cups, mother, are for birds to drink out of; then I'll make some for seeds, and then some bath-tubs for them."

14. "Where are your birds, Franco?"

15. "The eggs for them are not laid yet! But they will be in the spring," he said, with a merry shout, "and I'll make the birds tame, and sell them, and buy you everything you need, mother!—It will be splendid, mother!" he added after a little; "I will get some willows and build a real bird-house."

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[1] **Whistle,** *whis'sl.*

16. "But your birds must be fed, Franco."

17. "I know it; I'll give them my dinner, and not care for myself."

18. The mother smiled sadly: for she did not know how much a boy can do when his heart and mind are at work with a will; but she would not dampen his pleasure by saying a discouraging word.

19. Instead of dying out, his thoughts kept growing—and thoughts do grow,—and he not only tamed some birds, but he taught them little tricks, and they sold well.

20. Then his thought was very large: he would have an exhibition of tamed birds! He got some partridges—for those he found learned best—and trained them. Some he harnessed to a little brass cannon, and they would draw it across a table, while others would be armed with wooden swords, and all would march and wheel and form as Francesco beat on a ti'ny drum. Then all would stand still while one bird would fire off the cannon.

21. One bird was his special pet, and grew to be his firm friend and constant companion. It learned everything, and helped him to teach the other birds, and it seemed as if they knew what the partridge said to them.

22. It would scold, and even punish them, if they did not obey. But it was never content away from Franco. If he went to the woods or to the city, it would always go with him,—sometimes riding on his head, sometimes on his shoulder, and sometimes flying around him, so that "the young bird-tamer and his bird" were spoken of together.

23. But once his faithful partridge left him,—at a time, too, when he was feeling very sad, because a beautiful goldfinch he was taming for a lady had flown away, and he was almost discouraged.

24 On the fifth day, however, back came the goldfinch chased by the partridge, which settled on Franco's hand with the air of a conqueror and love of a faithful friend.

25. This noble boy fell sick. He wanted his birds, and they were let into his room; they hovered around his bed, rested on his pillow, and ate from his hand and sang to him. But the partridge would not eat or make a sound.

26. The moment came when the doctor said those sad words, "No hope." Not one moan rose for himself. But "*Who will take care of my mother—of my mother*—of—my—moth—er?" he moaned until the pale lips grew cold, and the bright eyes closed.

27. They put the birds back into the aviary,[1] but the partridge could not be coaxed or driven from Francesco. They laid him in the coffin, and the partridge perched on it; they bore him to the churchyard and it flew over, and with an eye fixed on that coffin, watched as they lowered it into the grave.

28. Night and day it stayed in that tree, going away sometimes for food, but returning to the same tree, from which it could not be coaxed.

29. Watching, waiting, mourning, the loving little bird-heart broke, and they laid it with tender hands and tearful eyes on the grave of him it had loved so well.

N. Y. Observer.

[1] **Aviary**, *a'v-i-ary*, a place to keep birds in.

XXIV. SPELLING AND WRITING.

BIRDS OF PREY—FLESH-EATERS—WITH HOOKED BILL AND SHARP TALONS:

Condor, Eagle, Vulture, Hawk, Owl.

CLIMBERS:

Parrot, Cockatoo, Woodpecker, Toucan.

RUNNERS (WINGS NOT ADAPTED TO FLYING):

Ostrich, Emu, Cassowary.

WADERS (LONG LEGS, NECK, AND BILL):

Heron, (F.*) *Stork,* (M.) *Crane,* (F.M.)
Ibis, (M.) *Flamingo,* (F.) *Snipe.* (M.)

SWIMMERS (WEB-FOOTED):

Goose, Duck, Swan, (M.) *Flamingo,* (F.M.)
Gull, (F.) *Cormorant,* (F.) *Pelican,* (F.) *Stormy Petrel,* (F.) *Penguin,* (F.) *Auk,* (F.) *Albatross,* (F.)
Puffin. (F.)

* Those marked (F.) are Fishers; (M.) Migratory or Birds of Passage

Catching Cattle with the Lasso.

XXV. ABOUT QUADRUPEDS.

HERE are two herdsmen riding rapidly after a herd of CATTLE and throwing their lassoes. A lasso is a rope about half an inch thick, made of strips of leather, and about thirty feet long, with a slip-noose at one end that runs very easily. The other end is fastened securely to the front of the saddle.

2. These men are so skillful in throwing the lasso that they can catch a bull by any one of his legs or by either horn. The horse is trained

to stand still as soon as the lasso is thrown, with his fore feet well braced to meet the shock. Sometimes a bull thus caught by the horns in full career turns a complete somerset, and, falling heavily on his back, is so thoroughly jarred that he is disposed to be very submissive, and trots on quietly with the herd.

3. Millions of cattle feed on the vast grassy plains of **Texas, Mexico,** and **South America.** Their value lies chiefly in their flesh, which is called beef; their hides, which are manufactured into leather; and their tallow, which is used in making soap and candles.

4. Cattle are numerous also in **Russia, India,** and our Western States and Territories.

What does the cow give us? What is made from milk? What is the flesh of calves called? *Veal.*

5. Leather is made from the hides and skins of cattle, horses, goats, sheep, deer, and buffalo. Its manufacture is one of the most important industries in the **United States** and **England.**

6. Here is a herd of BUFFALOES, which are more properly called bisons. Indians are pursuing them. They are killed with guns, spears, bows and arrows. Their flesh is used for food.

7. An Indian has been known to send an arrow with such force that its head has gone entirely through the body of a buffalo. The dressed skin of the buffalo is called a buffalo robe, and many of them are used in this country in winter, when people go in sleighs over the snow.

American Indians Hunting Buffaloes on the Prairies.

8. The Indians use buffalo skins for clothing and for tents, as well as for making a peculiar kind of shoe called a moc'casin.

9. BUFFALOES were formerly found as far east as the State of **New York,** but now none are found east of the **Mississippi River,** and they are constantly diminishing in numbers.

10. The American BUFFALO, or BISON, is also hunted by wolves. These join in a pack and try to cut off one of the buffaloes from the herd.

11. The true buffalo has long horns, and resembles a cow. The buffalo, zebu, and yak, when tamed, work like the ox, or give milk like the cow.

Blackboard drawing of Yak and Zebu; each about 6 feet 6 inches in length.

12. The YAK is larger than common cattle. It has a bushy tail and long hair, from which tents and ropes are made. It is found in Thibet (*tib'et*) and other parts of Central Asia, both in the wild and the domestic state.

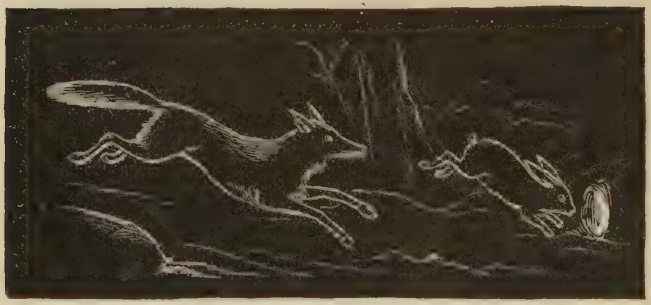
13. The ZEBU resembles an ox, except that it has a large hump on its back over its shoulders. Some are wild and some are domesticated in Asia, Africa and the islands of the Indian Ocean. Hindoos consider the Zebu sacred.

Buffalo of the East; length 10 ft.

14. The true BUFFALOES inhabit Asia and Africa, where they run in herds and are fierce and strong. One is able to kill an elephant.

15. The GNU of South Africa has a body like that of a horse, and a head and horns like those of an ox.

16. Of all animals the DOG shows the greatest affection for his master, whose smile, or frown,



Fox Chasing a Rabbit.

or word, gives either pleasure or pain to this faithful companion of man.

17. He is ever ready to risk his life for his master; and so constant is he, that when death has entered his master's home, this devoted creature has been known to grieve his life away on the newly made grave.

18. Especially useful and intelligent are the shepherd's dog, the Newfoundland dog, St. Bernard dog, the fleet greyhound, the keen-scented hunting dog, the courageous bull-dog, and the rat-killing terrier.

19. Animals of the dog kind include the WOLF, which lives in a wild, savage state, and is always in search of plunder; the FOX, which is noted for its cunning, sly, and thieving disposition; and the JACKAL, of Asia and Africa, which, like the wolf, hunts in bands or packs.

20. There is an interesting animal found upon the prairies, called the PRAIRIE DOG. These little animals burrow in the ground like rabbits, and live in communities so numerous that their "dog town," as it is called, sometimes extends for miles.

21. Another very common animal is the CAT. Of this

kind are the WILD CAT, LION, TIGER, LEOPARD, JAGU-AR PUMA, and LYNX.

22. The LION is called the "king of beasts," lives in Asia and Africa, and is noted for its powerful claws and great courage; the TIGER inhabits the jungle-grass of Southern Asia, has a striped body and a fierce disposition, and does not hesitate to attack even the elephant or man; the LEOPARD of Asia and Africa resembles the Tiger, except that its beautiful and valuable skin is spotted; the JAGUAR' or South American Tiger is spotted like the Leopard, and is strong enough to carry off a horse; the PUMA is called the American lion; the LYNX resembles the cat.

23. Animals of the dog and the cat kind are eaters of flesh, and are therefore called carnivorous. Animals which are tame and live in or near people's houses, are domestic animals; others are wild.

Is a dog a domestic, or wild animal? A lion? A tiger? A cat? A wolf? A leopard?

24. The animal which most resembles man is the GORILLA. Its head and arms are longer than those of a man. Its mouth is very projecting. Some Gorillas are nearly as tall as a man, but they are usually seen in a bent or crouching posture. The coarse hair which covers them is either gray or blackish. A full grown Gorilla is savage and powerful, being feared even by the lion. When about to attack an enemy, he stands up,

Gorilla.

beats his breast, and gives a loud and terrific roar. His food is vegetables, sugar-cane, berries, and fruits.

25. The CHIMPANZEE, the BABOON, APE and ORANG-OUTANG are smaller than the Gorilla. The Gorilla and Chimpanzee have both been called "wild men of the woods."

26. The common MONKEY has a flat face and long tail; it is a great mimic, quite ingenious and very mischievous. There are many varieties of monkeys. Some seem to be constantly chattering, crying, jumping and swinging, while others are grave and silent. In some parts of India a light-colored monkey is considered sacred by the natives.

27. Monkeys in South America have a curious way of crossing a stream. One holds on to a limb of a tree, and to him a long line of monkeys will fasten themselves by means of their arms and tails. When the line is long enough, they will swing themselves until the one at the other end of the line will swing across to a tree on the opposite bank, and take hold of it; then the first monkey lets go, and all swing across.

28. The Gorilla and Chimpanzee are found in the forests of Western Africa; the Monkeys, Apes, etc., in the warm parts of Asia, Africa, South America, and on the islands southeast of Asia.

29. The celebrated traveler Du Chaillu tells some very interesting stories about Gorillas, which he was the first to capture.

30. Here is one: "One day, I remember well, we were out for Gorillas, which we knew were to be found thereabouts by the presence of a certain kind of fruit of which the animal is fond.

"We beat the bush for two hours, when suddenly an immense Gorilla advanced out of the wood straight toward us, and gave vent, as he came up, to a terrible howl of rage, as much as to say, 'I am tired of being pursued, and will face you.'

"It was a lone male, the kind which is always most ferocious. This fellow made the woods resound with his roar, which is really an awful sound, resembling very much the rolling and muttering of distant thunder.

"He was about twenty yards or steps off when we first saw him. We at once gathered together, and stood in silence, gun in hand.

"The Gorilla looked at us for a minute or so out of his evil grey eyes, then beat his breast with his gigantic arms —and what arms he had!—then he gave another howl of defiance, and advanced upon us. How horrible he looked! I shall never forget it.

"Again he stopped, not more than fifteen steps or paces away. Again he advanced. Now he was not twelve yards off. I could see plainly his ferocious face. It was distorted with rage; his huge teeth ground against each other, so that we could hear the sound; the skin of his forehead was drawn forward and back rapidly, which made his hair move up and down, and gave a hideous expression to his face. Once more he gave out a roar which seemed to shake the woods like thunder. Looking us in the eyes and beating his broad breast, he advanced again.

"'Don't fire too soon,' said one of my hunters; 'if you do not kill him, he will kill you.' As the Gorilla came up,

'Now!' shouted the hunter, and before the Gorilla could utter the roar for which he was opening his mouth, three musket balls were in his body. He fell dead almost without a struggle.

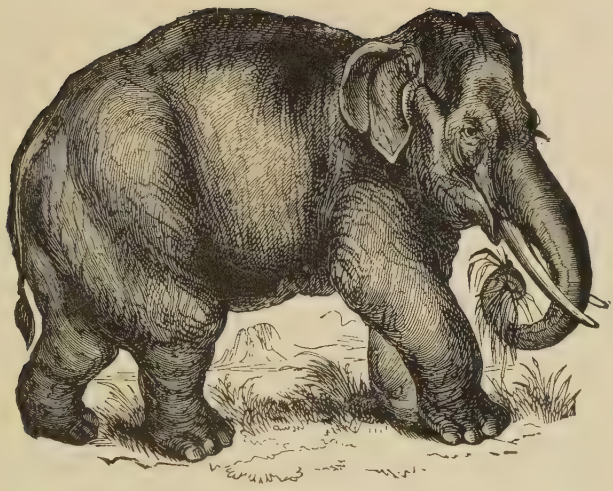
"He was a monstrous beast, indeed, although not among the tallest. His height was five feet six inches. His arms had a spread of over seven feet. His chest measured fifty inches around. His arms seemed like immense bunches of muscles only; and his legs and claw-like feet were well fitted for grabbing, climbing and holding.

"The face of this Gorilla was intensely black. His body was covered with gray hair, except his chest, which was bare. While the animal approached us in his fierce way, walking on his hind legs and facing us, it really seemed to me to be a horrible likeness of a man."

31. The ELEPHANT is the largest, strongest, and heaviest quadruped, or four-footed animal. His body is covered with a very thick hide, without hair. His legs are thick and clumsy.

32. He has a long trunk or nose, called a proboscis (*pro-bos'sis*), which can lift a large or a small object, even as small as a pin.

33. His trunk is very powerful. It is his means of defence and offence; with it this enormous creature conveys food and water to his mouth, which is just under it and at its base. He also draws water into his trunk, to wash himself with, which he does by blowing it out all over him.



Elephant.

34. His two long tusks of ivory project from the sides of his mouth; with these he digs in the ground for the roots and vegetables which constitute his principal food. He is also fond of sugar-cane.

35. The Elephant is brave and affectionate; he is also either grateful or revengeful, according as he is treated. He is fond of music. In India he has been taught to hunt the tiger, fight in battles, dance and perform tricks even on a tight-rope. Some elephants live to be one hundred years old,

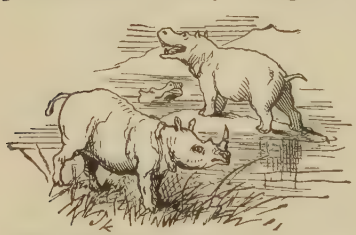
Tiger Hunting.

36. Another very large animal, one that is much longer than the elephant, but not so high, is the HIP-PO-POT'A-MUS.

37. These animals are quite gentle, except when hungry; but if you could see their huge jaws open a distance of two feet in width, showing teeth a foot in length, you would be horrified, especially when you would see the immense quantities of vegetable food they require.

38. The warm waters of the Nile and other rivers of Africa are much frequented by them; and because they are able to live either on the land or in the water, they are said to be am-phib'i-ous.

39. The RHI-NOC'E-ROS is, like the hippopotamus, a very large, slow, stupid, amphibious animal. It is distinguished by its short, thick legs, heavy body, and large, curved horn at the end of its snout. Its hide is so hard, thick and folded that swords, spears, bullets, and the claws of the lion or the tiger have little or no effect. It is found in Africa, Asia, Java and Sumatra. The weight of a large



Rhinoceros and Hippopotamus.

rhinoceros is about three tons; of an elephant, five tons.

40. The BEAVER, also an amphibious animal, is remarkable for its activity, industry, and the wonderful instinct it possesses for building its house.

41. You cannot imagine how this is done. They commence by cutting or rather gnawing down trees, their only instrument being their teeth. They cut in such a way that the trees shall fall precisely where they want them. They next float them to the spot where they intend to fix their dwelling, and construct a dam. They always select trees which are up stream, so that the logs may be floated down by the current.

42. After the dam is completed, which is the common property of the beavers, they form into small societies and build their private residences! They make them very strong, by a sort of mortar or mud, which they know well how to mix. They are therefore masons and carpenters at the same time. This work is all done at night.

43. The beavers store bark for food in these houses, each apartment having its own storehouse. If danger comes to them, they sound the alarm with their tail, giving one to four blows.

44. The beaver inhabits northern Asia and America. It lives on the bank of a stream, has webbed hind feet, and is an excellent swimmer and diver. It is a little larger than a cat.

45. The fur of the beaver is very valuable.

46. The MUSKRAT is something like the beaver in its size, form, habits and disposition,

for both animals live in companies in the winter, build houses for their families, and are hunted for their fur.

47. The muskrat does not, however, lay up stores for the winter like the beaver, but simply makes a way under the snow by which it may go in and out for water and the roots upon which it feeds.

48. There is a very small animal, the size of a big, fat mouse, which burrows and lives in the ground all the time. It is the GROUND MOLE.

49. Unlike the beaver and the muskrat, it keeps always just under the surface of the ground: and, although it annoys farmers by raising long ridges in their fields and gardens, it does more good than harm in eating up worms and insects.

50. There is another very industrious little animal, which is like the beaver in laying up food for the coming winter, in the shape of nuts and acorns. Do any of you know its name? Yes, it is the SQUIRREL. It makes a funny appearance as it eats, using its paws for hands, and sitting up as you do at the dinner-table.

51. Squirrels are found in almost every country in the world; and sometimes they will migrate by thousands. (Migrate means to seek a new home).

52. It is said that neither rocks nor rivers nor forests nor mountains will stop them; and that if they find a river too wide for them to cross, they will go back into the forest and provide themselves each with a piece of bark,

Squirrel.

and then they put out to sea, making their tails serve as sail and rudder.

53. It often happens, however, that they have ventured too far, and cannot contend against the waves, and therefore never reach the other side. The Laplanders watch for these misfortunes and seize them as a prize, not only because they can sell their skins, but for their flesh, which is good for food.

54. The FLYING SQUIRREL is provided with a strip of skin which it spreads out to enable it to sail or glide easily from a high to a low place among the trees. It cannot use this wing-like skin as birds do. It seldom ventures out till after sunset.

Besides the beaver, muskrat and squirrel, can you mention some other and better known little animals which are remarkable for gnawing? *Rats and mice.*

55. The PORCUPINE which is about eighteen or twenty inches in length, also prefers the night for its movements.

Blackboard Drawing: Porcupine, 20 inches long; Flying Squirrel, 15 inches long.

It is very active in searching for food, which consists of roots, fruit and bark. It is remarkable for being covered with sharp, strong quills, which it has the power of straightening out in all directions, when attacked, thus causing great damage to the mouth of any animal bold enough to take hold of it.

56. The CAMEL is the best fitted of all animals for traveling in desert places, because, first, it can take a week's supply of water in a peculiar arrangement of cells connected with the stomach, which can be supplied from them when the animal is thirsty; secondly, it can live on the scanty herbage of the desert; thirdly, under each foot is a large cushion-shaped substance to prevent it from sinking in the sand.

57. The camel has been called the "ship of the desert." On the approach of a sand-storm in the desert, when clouds of fine sand are whirled about by high winds, the camel displays great sagacity in burying his nose in the sand to avoid suffocation. Its flesh and milk are used for

Arab Family Moving.

food, its skin for making leather, and its hair for making clothing; therefore the camel is to the Arab what the seal is to the Esquimaux, and the reindeer to the Laplanders—their chief wealth.

58. Some camels have one hump (the Dromedary or Arabian Camel), and others two (the Bactrian Camel of China and Central Asia). The former is the one chiefly used in Africa. The latter is larger and is used more as a beast of burden.

59. A similar but much smaller animal is the **Llama**, found in the warm parts of South America.

Giraffe.

60. The tallest animal in the world is the GIRAFFE (ji-raf') or Ca-mel'o-pard, which belongs to the deserts of Africa.

61. It is especially remarkable for the great length of its neck and legs. In the absence of grass, this animal can make its food of the leaves of the trees. Its height is about eighteen feet.

62. There is a beautiful animal in Southern Africa which is about the size and shape of a pony, but has black and yellow stripes running around its body and legs. What is its name? The *Zebra*. ZEBRAS run wild in herds and are very difficult to tame.

63. The most useful animal to man is the HORSE, which is found in almost every country in the world where work is to be done. Arabia has long been celebrated for fine horses. The Arab loves and treats his horses as if they were his children.

64. There is an animal of the horse kind which is said to be the most obstinate and yet the most patient of all animals; what is it? The DONKEY will, however, do more work for the smallest pay than any other animal,

except, perhaps, the camel. Although much smaller than a horse, he will take you on long journeys and over dangerous places, and be content with a little grass or even a few weeds. Donkeys are very useful to the poor people of Africa, Asia and Europe.

Tapir, length, 5 feet; Sloth. length, 18 inches.

65. The TAPIR of South America is all black or dark brown, and looks like a big fat hog; and, like the hog, it delights in wallowing in the mud. It has a short proboscis or trunk. Its height is between three and four feet; but the tapir of Asia is larger and has a white back.

66. Of all animals the slowest and laziest is said to be the SLOTH, which lives in South and Central America.

67. While some animals and people too are idle from choice, this poor creature is almost helpless; the slightest movement seems to give it great pain, judging from the piteous cry it sets up. It is therefore to be pitied, not blamed. To take fifty steps would require a whole day. The sloth is about the size of a large cat. Its hair is coarse, its arms very long, and legs short, and it is always found hanging under a branch of a tree, even when asleep. It makes its food of leaves, fruit, and bark. Some sloths have two toes or claws and

Blackboard Drawing: Opossum and her Family. Length of body, 20 inches.

others three on each arm and leg. They seldom touch the ground unless they tumble.

68. Another very curious little animal found in South America is the ARMADILLO; it wears a kind of coat of mail or hard, horn-like case, into which it can retreat as the snail or the turtle does when it is attacked. In form, head, and tail, it resembles a very big rat, but it is as long as a cat. With its sharp claws, it burrows in the earth for worms and roots. Its flesh is used for food.

69. There is another animal which resembles a rat and is as big as a cat, and that is the OPOSSUM, which lives in North and South America. It usually hides away in the daytime in hollow trees or in the ground, and steals out at night in search of food—berries, fruit, eggs, birds, etc.; sometimes, too, killing chickens to suck their blood. It is very sly; when caught, it will make believe dead and cunningly watch its opportunity to escape; this is the origin of the expression "playing 'possum." This animal can cling tightly to the branch of a tree by means of its long, strong tail, which it winds around it when it wants to gather fruit or to seize a little bird for its supper; but

one of the funniest sights is that of a mother-opossum running off with all her young ones on her back holding on by their tails, as shown in the blackboard drawing.

70. The animal which is remarkable for leaping or springing is the KANGAROO, of Australia.

A Kangaroo.

71. Its fore-legs are short and like arms, while its lower limbs are very long and strong, thus enabling it to take leaps or bounds, upwards of twenty feet in length. Its head resembles that of a deer. Its tail is so powerful that a blow from it has been known to break the legs of a man.

72. When sitting, a full-grown kangaroo is as tall as a man. It is hunted for its skin and flesh.

73. Like some opossums, it has a pouch or pocket into which its young take refuge when alarmed.

74. A bear is more at home in a cold country and more comfortable in cold weather. The WHITE or POLAR BEAR lives among icebergs and feeds chiefly on fishes and seals.

75. White bears are fierce and strong; and

Esquimaux with their dogs, capturing a White Bear for his fur and flesh. Near the Icebergs are Walruses, which are hunted for their flesh, oil, skin, and tusks of ivory.

like all other bears, have powerful paws and long, sharp claws with which they soon tear another animal or a man to pieces. Savage and dangerous as they are, the Esquimaux of the Arctic Regions hunt and capture them with dogs and sharp spears.

76. The flesh of these animals is used for food, but their chief value lies in the long white furs. Perhaps some of you have seen such skins or robes in sleighs.

77. The common BLACK BEAR of North America and the BROWN BEAR of Europe are very much alike. They prefer the mountain districts. They are not so large nor so fierce as some other bears, but when attacked, they rise upon their hind feet and, if not promptly dispatched with the long knife or the bullet, the assailant is at once hugged to death with their powerful arms or torn to shreds by their sharp claws.

78. Their food consists of flesh, wheat, corn, roots and vegetables; they are very fond of honey, often climbing high trees in search of it.

79. The CINNAMON BEAR of Colorado and the region west of it, is named on account of its color, which is a yellowish red.

80. The most savage of all is the GRIZZLY BEAR, whose home is in the Rocky Mountains. Grizzly means somewhat gray.

81. Its strength and endurance are very great, for it has been known to kill and carry off a buffalo, to chase a man for long distances, capture and devour him. When overtaken by hunters, and after receiving several of their bullets, it makes desperate efforts to escape by running and swimming.

82. In winter, some bears hide themselves in caves,

Wolf. **Bear.** **Am. Buffalo or Bison.**

Blackboard drawing of Wolf's head, 10 inches long; of Bear's head, 15 inches; of Buffalo's head, 24 inches. (Full size.)

hollow logs, and holes in the ice or snow, and pass several weeks in a kind of sleep.

83. The affection of bears for their young is very remarkable. When one of her cubs is shot, the grief and cries of the mother, her frantic efforts to arouse it, and her refusal to leave it even when the bullets are whistling past, show her anxiety for her cub to be far greater than that for herself.

84. DEER are found in all parts of the world, —in cold, hot, and temperate regions; in forest, jungle, swamp and prairie, —except in Australia.

Buffalo (bison) and Deer.

85. Deer are very timid. Whenever they discover an enemy they are off with the speed of a race-horse.

Blackboard drawing of a Reindeer (length 7 feet), and Sledge of a Laplander.

86. Like the buffaloes, they are hunted for their flesh, skins, and horns, but often only for sport.

87. The most useful of these animals is the REINDEER, which is a domestic animal in parts of the Arctic regions, and constitutes the chief wealth of the Laplander of Northern Europe. His herds supply him with milk, flesh and materials for clothing, and some of these animals are trained to drag his sledge swiftly and for long distances over the frozen snow.

88. In summer the reindeer lives on the scanty herbage and shrubs of those regions, and in winter, on the mosses which lie under the deep snow. These mosses are discovered by his sharp scent, and he is able to dig down to them through the snow, by means of his great branching horns. Some reindeer are wild and live in large herds.

89. Herd is a number of animals assembled together, as a herd of cattle, oxen, horses, camels, deer, elephants, or swine; flock refers chiefly to smaller animals and birds,

as sheep, goats, or pigeons; drove is a number of cattle driven to market.

90. Deer and some other animals chew the cud; that is, when grazing, they only partly chew the food before swallowing it, and, when they afterwards lie down or stand still, they bring up the same food into their mouths again to chew and swallow it a second time. Such animals are called Ruminating or Cud-chewing animals. They generally have horns and cloven or divided hoofs. They include the cow, ox, deer, camel, giraffe, goat, sheep and buffalo.

91. Animals of the deer-kind include the Antelope and Gazelle of Africa and Arabia, the Chamois (*sham'me or sham-moi'*) of the Alps, and the Moose of North America.

92. The HYENA is a savage and untamable animal of Africa and the warm parts of Asia. It looks like a very large dog. Its teeth are wonderfully strong. It eats the flesh and bones of dead animals.

XXVI. SPELLING AND WRITING.

ANIMALS WHICH MOST RESEMBLE MAN:

Gorilla, *Chimpanzee.*

ANIMALS OF THE MONKEY KIND (FOUR-HANDED INSTEAD OF FOUR-FOOTED):

Gorilla, *Chimpanzee,* *Orang-outang,*
Ape, *Baboon,* *Common Monkey*

ANIMALS OF THE DOG-KIND:

Dog, Wolf, Fox, Jackal.

THE CAT-KIND:

Cat, Lion, Tiger, Leopard.
Puma, Jaguar, Lynx, Wild Cat.

EATERS OF FLESH:

The Dog-kind, the Cat-kind, besides the Bear, Raccoon, Hyena, Opossum, Seal.

EATERS OF GRASS, AND CUD-CHEWERS, WITH HORNS AND CLOVEN HOOFS (TWO TOES):

Cow, Ox, Sheep, Goat, Llama,
Camel, Giraffe, Deer, Buffalo.

GNAWERS:

Rat, Squirrel, Beaver, Porcupine,
Mouse, Prairie-dog.

ANIMALS WITH FOUR SOLID HOOFS:

Horse, Donkey, Mule, Zebra.

AMPHIBIOUS ANIMALS:

Beaver, Rhinoceros, Hippopotamus, Seal.

The Frog ↻. Alligator and Crocodile (reptiles) are also amphibious.

XXVII. ADVENTURE WITH WOLVES.

IN the month of March, when the snow lay deep upon the ground, Lawrence Temple, a clerk at a lumber camp on the head-waters of the Ottawa River in Canada, was dispatched to Ottawa city, a distance of some two hundred miles, to report to the agent of the company the quantity of timber that had been got out, and to bring back a sum of money to pay off a number of the lumbermen.

2. Several of these were about to take up land in the new townships which had been recently laid out on the upper Ottawa; and as Lawrence had won the confidence of the company, he was commissioned to bring back the money required for making the payments. He was to ride as far as the town of Pembroke, about half way, and leaving his horse there to rest, was to go on to Ottawa in the stage. He selected for the journey the best animal in the stable—a tall, sinewy horse of rather ungainly figure, but with an immense amount of endurance and pluck.

3. He reached Ottawa safely, and transacted his business satisfactorily. Having drawn the money from the bank, chiefly in English sovereigns and Mexican dollars, Lawrence set out on his return journey.

4. At Pembroke, he mounted again his faithful steed for his ride of over a hundred miles to the camp. The silver he carried in two leathern bags

in the holster of the saddle, and the gold in a belt around his waist. He also carried for defence one of the newly-invented Colt's revolvers.

5. Toward the close of the second day, he was approaching the end of his journey, and indulging in a pleasant anticipation of the feast of venison he should enjoy, and of the refreshing slumber on the fragrant pine-boughs, earned by continued exercise in the open air. The moon was near the full, but partially obscured by fleecy clouds.

6. As he came to a slight clearing in the woods, he observed two long, lithe animals spring out of the woods toward his horse. He thought they were a couple of those large, shaggy deer-hounds which are sometimes employed near the lumber camps for hunting cariboo, and looked around for the hunter, who, he thought, could not be far off.

7. He was surprised, however, not to hear the deep-mouthed bark characteristic of these hounds, but instead a guttural snarl, which appeared to affect the horse in a most unaccountable manner. A shiver seemed to convulse his frame, and shaking himself he started off on a long, swinging trot, which soon broke into a gallop.

8. But his best speed could not outstrip that of the creatures which bounded in long leaps by his side, occasionally springing at him, their white teeth glistening in the moonlight, and snapping when they closed like a steel-trap. When he caught the fiery flashing of their eyes, there came the blood-curdling revelation that these were no hounds, but hungry wolves, that bore him such sinister company.

9. His only safety, he knew, was in the speed of his horse; and he was handicapped in this race for life with about five-and-twenty pounds of silver in each holster.

10. Seeing that the horse was flagging under this tremendous pace, he resolved to abandon the money, so he dropped both bags on the road. To his surprise the animals stopped. He could hear them snarling over the stout, leather bags; but, lightened of his load, the horse sprang forward on a splendid gallop.

11. He was beginning to hope that he had fairly distanced the brutes, when their horrid yelp and melancholy, long-drawn howl grew stronger on the wind; and soon they were again abreast of the horse.

12. He now threw down his thick, leather gauntlets, with the hope of delaying them; but it only caused a detention of a few minutes while they greedily devoured them.

13. He was rapidly nearing the camp; if he could keep them at bay for twenty or thirty minutes more, he would be safe. As a last resort, he drew his revolver, scarcely hoping, in his headlong pace, to hit the bounding, leaping objects at his side. The horse, too, was exceedingly nervous; and if he should miss, and in the movement be dismounted, he knew that the maw of those ravenous beasts would be his grave.

14. One of the brutes now made a spring for the horse's throat, but failing to grasp it, fell on the right side of the animal. Gathering himself up, he bounded in front, and made a dash at the rider, catching and clinging to the horse's right shoulder.

15. Lawrence could feel his hot breath on his naked hand. The fiendish glare of those eyes he never forgot. He felt that the supreme moment had come. One or other of them must die. In five minutes more he would be safe in camp, or else—and he shuddered.

16. He lifted up his heart in prayer to God, and then felt strangely calm and collected.

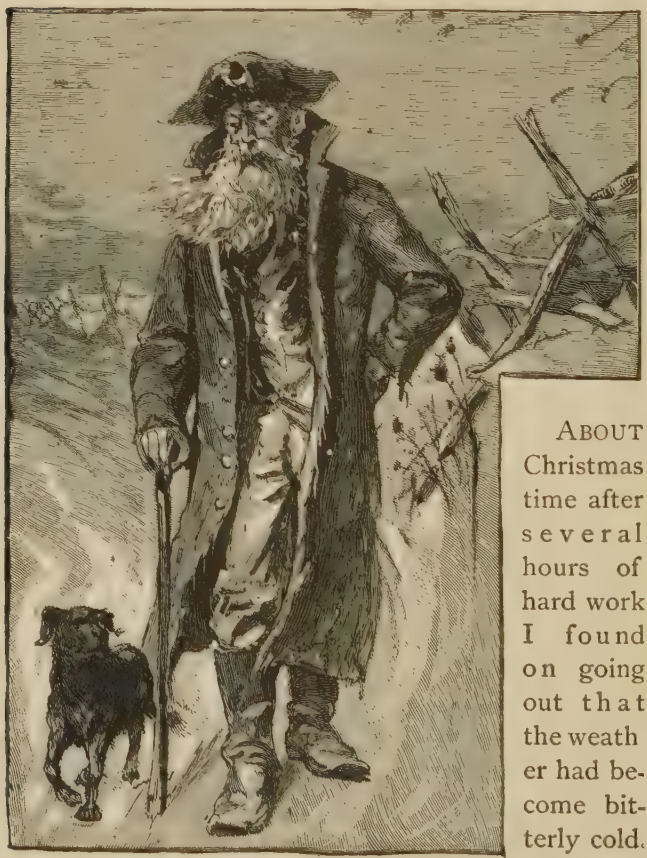
17. The muzzle of his revolver almost touched the brute's nose. He pulled the trigger. A flash, a crash! the green eyes blazed with tenfold fury; the huge form fell heavily to the ground, and in the same moment the horse reared almost upright, nearly unseating his rider and shaking the pistol from his hand, and then, plunging forward, rapidly covered the road in his flight.

18. As Lawrence had expected, the other famishing beast remained to devour its fellow. He galloped into the camp, almost fell from his saddle, and staggered to the rude, log shanty, where the blazing fire and song and story beguiled the winter night, scarcely able to narrate his peril and escape.

19. After light refreshments,—for he had lost all relish for food,—he went to bed, to start up often through the night under the glare of those horrible eyes, and to renew the horror he had undergone.

20. In the morning, returning with a number of the men to look for the money, he found the remains of the slain wolf, and some distance back, the straps and buckles of the money-bags, and the silver coins scattered on the ground, and partially covered by the snow.

XXVIII. THE BLIND MAN'S DOG.



The Blind Man and his Dog.

ABOUT Christmas time after several hours of hard work I found on going out that the weather had become bitterly cold.

2. Running along the poorly-lighted road, leading to the city of Lon-

don, I nearly stumbled against a man standing at the corner of the street; luckily, the glitter of metal on his cap caught my eye, and looking at this I saw that it was a brass plate with the word "Blind" engraved on it.

He had with him a little dog which kept at his side, eagerly watching him; the dog was in the roadway while his master kept tapping the edge of the pavement with his stick and intently listening for the sound of wheels.

4. At last the man said "Go;" and in an instant the little dog ran across the road, barking, as much as to say, Come on.

5. I was pleased to see that the two arrived quite safe at the other side. I at once entered into conversation with the blind man. I will now give you his history as he told it to me:—

6. "My name is James Stocks. I am seventy-eight years of age. I have been blind three years next April. My dog is as good to me as a pair of eyes. I call her 'Puss.' She is two years and a half old, and I gave two shillings for her to a stranger. A blind man told the stranger to bring her to me, as he knew I wanted a 'guide-dog.' I had to train her myself. I took her to the safest place I knew, that is, by the side of a long wall.

7. "At first she would only lag behind me, but I took her out for half an hour every day, and in two or three weeks she learned to lead me quite well. It took me longer to trust to the dog than it did for the dog to learn to lead me along, and now I can go anywhere with her.

8. "She knows her way as well as I do, and *I* have never been run over since I have had my Puss. I feed her on meat, and I give her an extra half-pennyworth whenever I can afford it. I cannot afford anything better for her, but she will eat cakes, and almost anything that the children give her in the streets. She has had several pieces of plum-pudding given to her this Christmas time.

9. "I come out with her every morning from twelve to three, and at night from six to ten, and I stand here selling lead-pencils, and sometimes the people give me a few half-pence.

10. "When it's very cold I carry a little chair in a bag at my back, for Puss to sit down upon to keep her off the cold, wet ground. I also tie a little bit of carpet on her, as I feel a great deal for my little dog. I always carry a little water for her in a bottle in my pocket; I give it to her in a penny tin-mug, and, bless you, the little dog knows her bottle and tin-mug when I draw them out of my pocket.

11. "As I stand at my post, Puss sits by my side as quietly as possible; but when she sees any one looking at me she stands up on her hind legs, wags her tail, and asks for something for me. I can't keep her down; just you try her now, sir, and see if she will do it."

12. So I rose, and went toward the blind man. In an instant, Puss, which had been curled up at her master's feet, was upon her hind legs begging for him, while every now and then she gave a sharp yap, as much as to say, "Do give us something; we are both very poor."

BUCKLAND'S LOG-BOOK.

Homes and Comparative Size of Animals, etc.: Those shown on this and the seven pages following are drawn on a SCALE OF ABOUT FIVE FEET TO THE INCH, which appears on the margin.

The **Ta'pir of South America** is black and resembles a hog. (P. 309.)

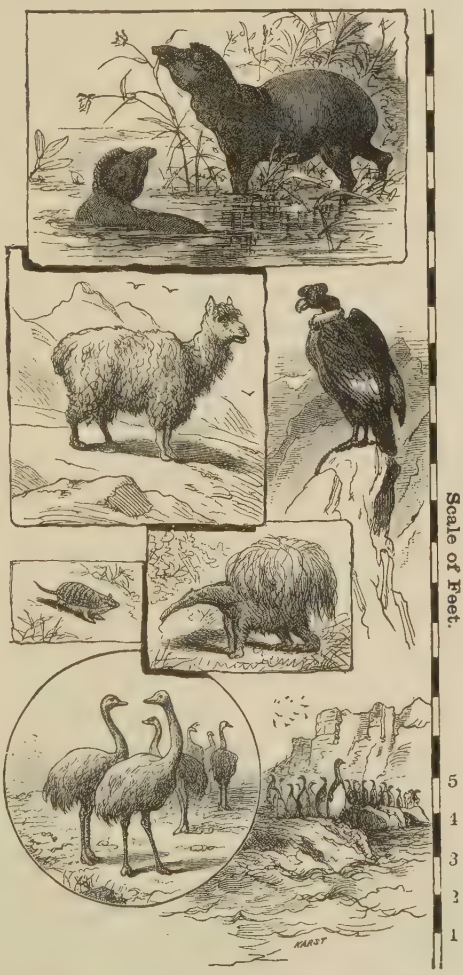
The **Llama** (*lah'mah*) inhabits the Andes. (P. 307.)

The **Cond'or** also inhabits the Andes. (P. 250.)

The **Armadillo** is protected by a kind of shell. (P. 310.)

The **Anteater** is remarkable for its long, slender tongue and bushy tail.

The **Rhea** is called the American ostrich. (P. 259.)



Penquins are birds of the Antarctic coasts. (P. 265.)

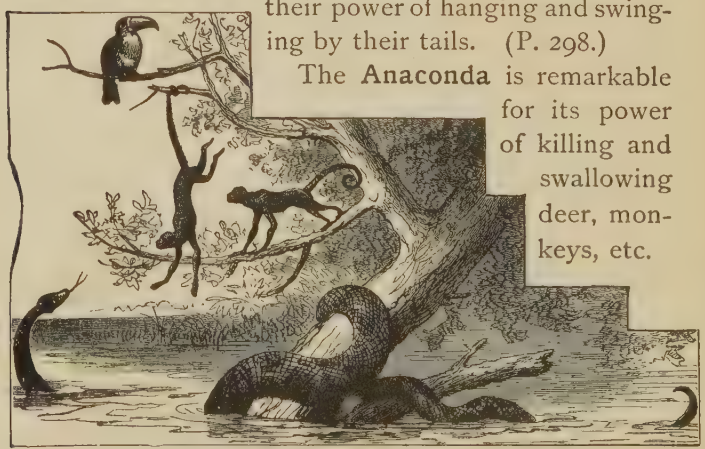
The **Cougar** (*koo'gar*) and the **Jaguar'**, which is larger, destroy and devour cattle, horses, etc. They belong to the cat family. (P. 297.)

The **Sloth** is usually seen hanging under a branch. It is slower in its movements than any other animal. It is about the size of a cat. (P. 309.)

The **Opossum** is noted for its shyness. It steals chickens, birds, eggs, etc., at night, for food. (P. 310.)

The **Toucan** (*too'kan*) has an enormous bill which is well adapted to eating fruit. (P. 256.)

Monkeys inhabit the warm countries all over the world. In South America, they are remarkable for their power of hanging and swinging by their tails. (P. 298.)



The **Anaconda** is remarkable for its power of killing and swallowing deer, monkeys, etc.

The **Fox** and **Wolf** belong to the dog family. The Wolf is larger, and, when hungry, very dangerous. It hunts man and horse for many miles and attacks them very savagely. (P. 318.)

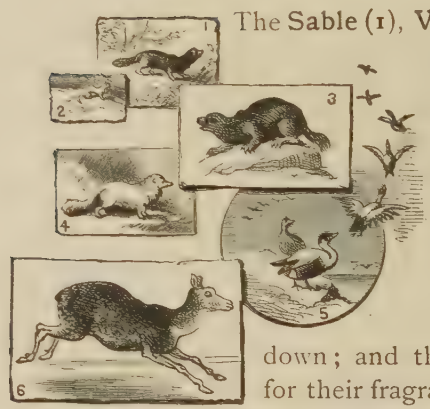
The **Brown Bear** is noted for passing the winter in a cave or hollow tree in a kind of sleep, taking during all that time neither food nor drink. It is found in the forests and mountains of both Europe and Asia. (See p. 313.)

The **I'bex** has long horns and resembles a goat.

The **Chamois** (*sham'my*), which is smaller than the Ibex, also resembles a goat, but has small horns. It is hunted among the Alps of Switzerland. Its skin is made into a soft kind of leather.

The **Wild Boar** is remarkable for its great tusks or teeth, and when hunted becomes very savage and dangerous.

The **Lam'mergeyer**, a kind of vulture, inhabits especially the Alps and Pyrenees, where it is very destructive to sheep, chamois, etc., which it captures or destroys by causing them to leap over precipices; then it gorges itself with their flesh.



The **Sable** (1), **White Ermine** (2), **Wolverine** (3), and **Arctic Fox** (4) inhabit the Arctic regions, and are valuable for their fur.

Eider Ducks (5) (*i'der*) are valuable for their soft down; and the **Musk Deer** (6) for their fragrant musk.

The **Bactrian Camel**, (7) which has two humps, is found chiefly in Asia; it is used as a beast of burden. (See pages 306 and 307.)

The **Jack'al** (8) is wild, and resembles a small wolf or dog. (See p. 296.)

The **Wild Boar.** (9.) (See p. 336.)

The **Pelican** (10) inhabits warm countries and lives on fish. (See p. 262.)

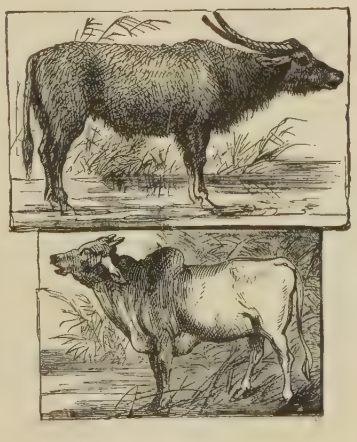
The **Yak** (11) is found in the central parts of Asia. (See p. 295.)

The Elephant and **Tiger** are natural enemies, and fierce battles are often fought by them. Tame elephants belong to Southern Asia. (P. 300.)

The **Ourang-Outang** is found in Southern Asia and neighboring islands. (P. 298.)

The **Leopard** is found in Asia and Africa. Like the panther and jaguar, it is spotted, and belongs to the cat family. (P. 297.)

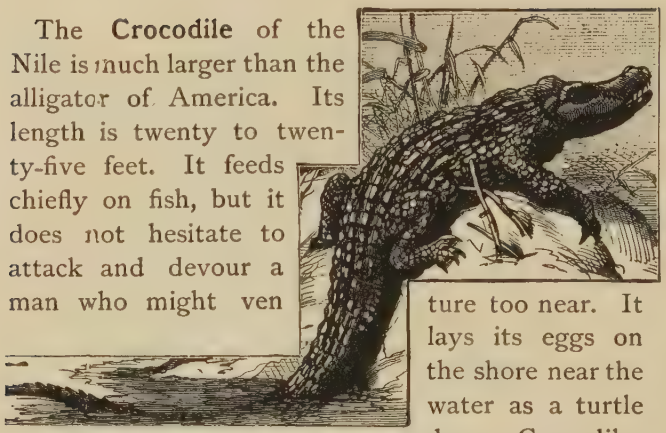
The **Co'bra de Capel'lo** is a small but very poisonous snake. The largest serpent in the world is the python, which is about thirty feet long.



The **Eastern Buffalo**, which is very unlike the American, is easily tamed and made useful. (Pp. 294, 295.)

The **Zebu** is distinguished by a hump over the shoulders.

The **Crocodile** of the Nile is much larger than the alligator of America. Its length is twenty to twenty-five feet. It feeds chiefly on fish, but it does not hesitate to attack and devour a man who might venture too near. It lays its eggs on the shore near the water as a turtle does. Crocodiles and alligators are found only in the waters of warm countries.



The **Arabian Camel** is very useful in Asia and Africa, where it is called "The Ship of the Desert."

The **Koo'doo**, or African antelope, has long, curiously twisted horns. The **Hyena** is a savage animal of Africa and Asia.

Arabian Camel. (P. 306.)

Koodoo. Hyena.

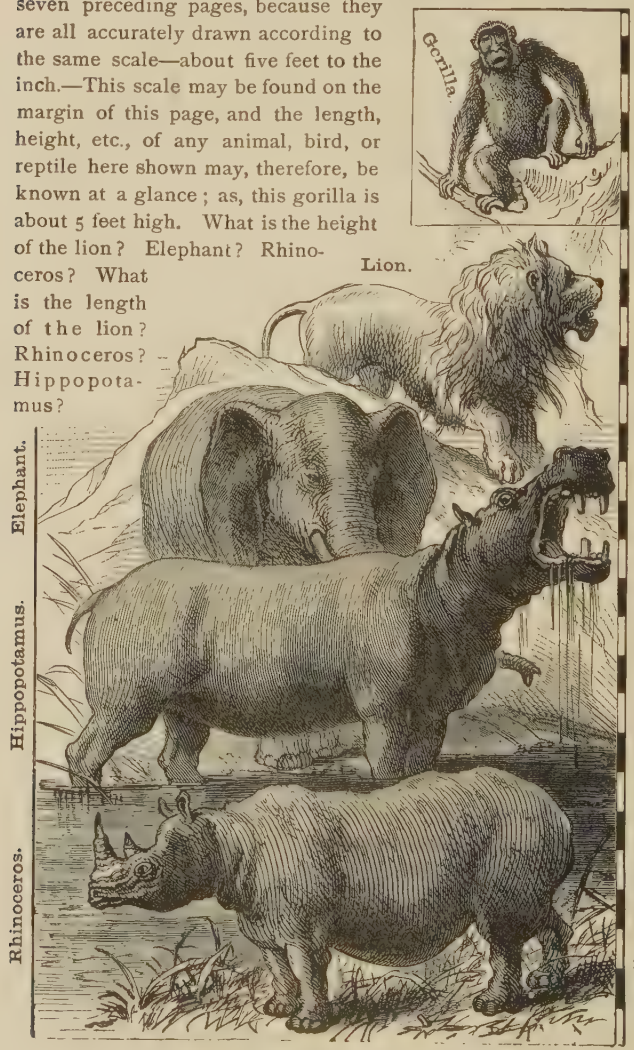
The **Gnu** (or gnoo, *nū*) a kind of antelope, somewhat resembles a horse, except that it has horns. These animals live in herds in South Africa, and often associate with zebras, (p. 308,) giraffes, and ostriches, (p. 258,) forming a large army of wild creatures. (P. 295.)

The **Puff Adder,** also of South Africa, is one of the most deadly of poisonous snakes, even horses dying a few hours after they are bitten. The natives procure poison from its teeth, and touch the heads of their fearful arrows with it.

The **Red Flamingo** is remarkable for the length of its neck and legs. Its color is mostly of a brilliant scarlet. (p. 263.)

The **Sacred I'bis** is mostly white with some black feathers. It is found in Egypt, where like the crocodile and some other creatures, it has been held sacred. It is not so large as the flamingo. (P. 262.)

The **Comparative size** of animals may be seen on this and the seven preceding pages, because they are all accurately drawn according to the same scale—about five feet to the inch.—This scale may be found on the margin of this page, and the length, height, etc., of any animal, bird, or reptile here shown may, therefore, be known at a glance; as, this gorilla is about 5 feet high. What is the height of the lion? Elephant? Rhinoceros? What is the length of the lion? Rhinoceros? Hippopotamus?



XXXIII. THE ELEPHANT.

IN the timber-yards of Birmah, which are large and numerous, the usefulness of the elephant is most wonderfully illustrated; for these uncouth monsters are employed in drawing, stacking, and shifting the immense teak[1] logs—some of them weighing as much as two tons. A log that forty men could scarcely move, the elephant will quietly lift upon his tusks, and holding it there with his proboscis, will carry it to whatever part of the yard he may be directed by his driver.

2. They will also, using trunk, feet, and tusks, pile the huge timbers as evenly and correctly as one could wish. What surprised us the most was to see the elephants select and pick out particular timbers from the center of an indiscriminate heap of more than a hundred simply at the command of the driver.

3. The huge beasts are directed by the drivers, by spoken orders, pressure of the feet on the neck, and the customary use of the elephant goad.[2]

4. The elephant knows his own power, and generally refuses to lift more than his tusks can safely bear, for if these should be broken off close to the head death would ensue.[3]

---

[1] **Teak,** *teek*, timber used in shipbuilding.

[2] **Goad,** *gōde*, a pointed instrument.

[3] **Ensue,** *en-sū'*, not *soo*, follow.

5. Perhaps it may be well to state why the white elephant is so specially reverenced.[1] It is believed that Buddha[2] is the divine emanation from the Deity,[3] and must necessarily abide for some time in that grand incarnation[4] of purity which is represented by the white elephant; that there is no spot in the heavens above, or the earth below, or the waters under the earth which is not visited by Buddha; that his tarrying may be longer in the white elephant than in any other abode; and that in the possession of the sacred creature they may possess the presence of Buddha himself. The so-called white elephant is not white. It is of a dull brownish-yellow color—white only by contrast with his darker brother.

6. Siamese are known to whisper their secrets into an elephant's ear, and to ask a solution of their perplexities by some sign or movement.

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[1] **Reverenced,** *rĕv'er-ensd*, to regard with fear, respect, and affection.

[2] **Buddha,** *bood'da*, a heathen god, worshipped in India and China.

[3] **The Deity,** *dē'i-te*, the Supreme Being or God. False deities are numerous in Asia and Africa.

[4] **Incarnation,** *in-kär-nā'shun*, a body of flesh.

Buddhism is a false religion of Southeastern Asia, founded many centuries ago by Buddha, who is now worshipped there. A recent traveler in Siam (Frank Vincent) thus describes one of their temples and images, "After a long ride, we reached a cavern in the side of a hill, styled the 'Cave of Idols,' consisting of several chambers connected by narrow passages, all requiring to be illuminated by torches. Its sides within were lined with rows of gilt Buddhas, and at the end of one of the halls is a huge reclining image. The trees about the mouth of the cave were filled with chattering and grinning monkeys. At sight of us they scampered from branch to branch and from tree to tree, and then would sit still and steadily observe us in a most amusing manner for an entire minute at a time. We inspected a colossal reclining image built of brick and mortar and covered with thick gold leaf; it was clothed with yellow garments. The length is 135 feet—its feet being seven feet in width, and its ears ten feet in length.

7. The last "white elephant" which reached Bangkok, the capital of **Siam**, was caught in the woods. When the king heard of it, he and his court went a long way into the country to meet him, and he was conducted with a grand procession, much pomp and music, and flying banners to the capital. There a grand mansion awaited him, and several of the leading nobility were appointed his custodians. The walls were painted to represent forests, no doubt to remind him of his native haunts, and to console him in his absence from them. All his wants were sedulously provided for, and in his "walks abroad" he was escorted by music and caparisoned by costly vestments. His grandest promenades were to bathe in the river, when other elephants were in attendance, honored by being made aids to his grandeur.

8. Now and then the two sovereigns sought his presence, but I did not learn that his dignity condescended to oblige them with any special notice. Everything associated with maj'esty and rank bore his image. A white elephant is the badge of distinction. On the royal flags and seals, metals and coins—everywhere the white elephant is the national emblem.

9. Thus it will be seen that in Siam and Birmah the "white elephant" is a grave and important appendage of state, and that the sovereign of each claims the coveted and pompous titles of "Lord of the Celestial Elephant," and "Master of Many White Elephants."

From Vincent's "LAND OF THE WHITE ELEPHANT."

XXXIV. ADVENTURES IN AFRICA.

EMERGING again into the broad sunlight, I strolled further in search of something to shoot. Presently, I saw, feeding quietly in the forest which bounded a valley on the left, a huge, reddish-colored wild boar, armed with most horrid tusks. Leaving Kalulu, my attendant, crouched down behind a tree, and my solar helmet behind another close by, that I might more safely stalk the animal, I advanced toward him, and after taking a deliberate aim fired.

2. As if nothing whatever had hurt him, the animal made a furious bound, and then stood with his bristles erected and his tufted tail curved over the back—a most formidable brute in appearance.

3. While he was thus listening and searching the neighborhood with his keen, small eyes, I planted another shot in his chest. Instead of falling, however, as I expected, he charged furiously in the direction the bullet had come, and as he rushed past me, another ball was fired, which went right through him; but still he kept on, until, within six or seven yards from the trees behind which Kalulu was crouching, he suddenly halted, and then dropped.

4. As I was about to advance on him with my knife, he suddenly started up; his eyes had caught sight of the little boy Kalulu, and were then almost immediately afterward attracted by the sight of the snowy helmet.

5. These strange objects proved too much for the boar, for, with a terrible grunt, he darted into a thick brake from which it was impossible to oust him; and as it was getting late, and the camp was about three miles away, I was reluctantly obliged to return without the meat.

6. On our way to camp we were accompanied by a large animal which persistently followed us on our left. It was too dark to see plainly, but a large form was visible. Late that night, we were startled by the roar of a lion, in close proximity to the camp.

HENRY M. STANLEY.

XXXV. A LION HUNT.

SOON after breakfast I took Khamisi and Kalulu with me for a hunt. After a long walk we arrived near a thin jungle, where I discovered the tracks of several animals—boar, antelope, elephant, rhinoc'eros, hippopot'amus, and an unusual number of imprints of the lion's paw.

2. Suddenly I heard Khamisi say, "Master, master! here is a 'simta' (lion);" and he came up to me trembling with excitement and fear, to point out the head of a beast, which could be seen just above the tall grass, looking steadily at us.

3. It immediately afterward bounded from side to side, but the grass was so high that it was impossible to tell exactly what it was.

4. Taking advantage of a tree in my front, I crept quietly onward, intending to rest the heavy rifle against it, as I was very weak from the effects of several fevers.

5. But my surprise was great when I cautiously laid it against the tree, and then directed its muzzle to the spot where I had seen him stand.

6. Looking further away, I saw the animal bound along at a great rate, and that it was a lion; the noble monarch of the forest was in full flight! From that moment I ceased to regard him as the "mightiest among the brutes." HENRY M. STANLEY.

XXXVI. THE KANGAROO.

I WONDER if my young readers know the origin of the name kangaroo? When Captain Cook first discovered Australia he saw some natives on the shore, one of them holding a dead animal in his hand.

2. The captain sent a boat's crew ashore to purchase the animal, and finding, on receiving it, that it was a beast quite new to him, he sent the boatswain back to ask the natives its name. "What do you call this animal?" said the sailor to the native. The native shook his head and answered, "Kan-ga-roo'," which means in Australian lingo, "I don't understand." When the sailor returned to the ship the captain said, "Well, and what's the name of the animal?" "Please sir, the black party says it's a 'Kangaroo.'" The beast has kept that name ever since

XXXVII. DOGS OF CONSTANTINOPLE.

CONSTANTINOPLE is an immense dog kennel; every one makes the remark as soon as he arrives. The dogs constitute a second population of the city, less numerous, but not less strange than the first. Everybody knows how the Turks love and protect them; and many provide for them in their wills, as they do for the birds.

2. Not one of the innumerable dogs of Constantinople has a master. They therefore form a great vagabond republic, collarless, nameless, houseless, and lawless. The street is their abode, there they dig little dens, where they sleep, eat, and die; no one thinks of disturbing their occupations or their repose.

3. They are masters of the highways. While in our cities it is the dog that makes way for the horseman or the foot passenger, there it is the people, the horses, the camels, and the donkeys that make way for the dogs.

4. In the most frequent'ed parts of Stam'boul four or five dogs, curled up asleep in the middle of the road, will cause the entire population of a quarter to turn out of the way for half a day. They are with difficulty disturbed even when in a crowded street a carriage with four horses is seen coming like the wind; then, at the very last moment, they rise and transport their lazy bones a foot or two out of the way—just enough to save their lives.

5. Laziness is the distinctive trait of the dogs of Constantinople. They lie down in the middle of the road, five, six, ten in a line, or in a ring, curled up so that they look more like tow-mats than animals, and there they sleep the whole day through, among throngs of people coming and going, and neither cold, nor heat, nor sunshine can move them. When it snows they stay under the snow; when it rains they lie down in the mud up to their ears.

6. The canine population of Constantinople is divided into quarters or wards. Every quarter, every street is inhabited or rather possessed by a certain number of dogs which never go away from it, and never allow strangers to reside in it.

7. They exercise a kind of service of police. They have their guards, their advanced posts, their sentinels; they go the rounds and make explorations.

8. Woe to any dog of another quarter which, pushed by hunger, shall risk himself within the territory of his neighbors! A crowd of curs fall upon him at once, and if they catch him, it is all over with him; if they cannot catch him, they chase him furiously as far as his own domain', watching carefully, however, not to venture a single step beyond the understood boundary line.

DE AMICIS.

Insects: Common House-fly, Mosquito, Butterfly, Beetle, Caterpillar, Grasshopper.

XXXV. ABOUT INSECTS.

1. INSECTS are everywhere about us. They are in great numbers and of great variety. They are in the air, in the water, and all over the Earth.

2. Those we know the best are the HOUSE-FLY, the BUTTERFLY, the MOSQUITO, the CATERPILLAR, the GRASSHOPPER, and the BEETLE.

3. Besides these, there are thousands upon thousands so small that they cannot be seen with the naked eye. There is scarcely a leaf on a tree that is not the home of myriads of these little beings.

4. If you should look at a drop of water with the aid of a microscope, you would be amazed

Caterpillar. Cocoon. Butterfly.
Blackboard Drawing: An Insect and its Changes.

to see the number and variety of living creatures which it contains; some swimming like fish or eels, some jumping like frogs, and some dragging their bodies lazily along.

5. Just think of ten thousand (10,000) occupying the space of a grain of sand. Creatures which are so small as to be invisible, or nearly so, to the naked eye, are called An-i-mal'cules.

6. Insects are of many kinds; some have to creep about all their lives; some creep only for a little while, like the Caterpillar, and then undergo changes, taking to themselves beautiful wings.

7. The CATERPILLAR is the form which the insect takes just after leaving the egg; after a while it spins or makes for itself a kind of case or covering, called a cocoon; the insect is then called a Chrysalis. After remaining a

while thus enclosed, this cocoon bursts open, and out comes a beautiful Butterfly, changed from what was, only a short time before, a slow, crawling, and repulsive looking Worm.

8. So, you see that the forms and changes of such Insects are—1st, the Egg; 2d, the Worm, Grub or Caterpillar; 3d, the Chrysalis; and 4th, the Butterfly, or perfect Insect.

9. Some kinds of Insects are very troublesome and often do great damage to trees and plants. You all know how soon one or two Caterpillars can eat up all the leaves of a little plant or bush in your garden, and that swarms of GRASSHOPPERS or LOCUSTS have in a few hours eaten up acres upon acres of growing corn, besides grass and vegetables.

10. The increase in the numbers of Insects is wonderfully rapid; indeed, if it were not for the multitudes of the busy birds whose food consists wholly or mainly of Insects, man might be unable to prevent the entire destruction of his orchards and his crops.

11. Great numbers of Insects are devoured by other Insects, and also by Toads, Frogs, and Ground Moles.

12. You must not think, however, that all Insects, Caterpillars and Butterflies are our enemies, for there are some kinds that are constantly at work for us.

13. All the beautiful silk dresses, handkerchiefs and ribbons are made from the material which formed the case or cocoon of a Caterpillar, called the SILKWORM.

14. The SILKWORM is hatched from an egg about the size of a mustard seed; it eats the leaves of the mulberry tree, its only food, and grows rapidly. In two or three weeks it begins to spin a very fine silken thread, which it winds round and round itself until a ball, the size and shape of a pigeon's egg, is formed.

15. When it is done spinning, the silk must be carefully and promptly unwound, or the Butterfly would burst the cocoon and thus spoil the silk. To prevent this the cocoons are sometimes placed in hot water or in a hot oven, to kill the worm. By means of steam or hot vapor, the threads are loosened so that they may be easily unwound and the Silkworm saved. The manufacturer usually puts ten or twelve of these threads together to make one which would be strong enough for use in the factory.

16. It is not a little singular that this beautiful article thus made by one Insect receives its bright crimson and scarlet colors from another, the COCHINEAL BUG of Mexico.

17. The SILKWORM is raised chiefly in China, Japan, France, Italy, and California. The Silkworm and other Caterpillars breathe through several openings in their sides.

18. Next to the Silkworm, the Insect which is the most useful to man is the BEE, which gives us delicious honey. This the Bees gather from nearly all flowers, and store away in nice little waxen cells, all of their own making.

19. HONEY-BEES are of three kinds: the Queens, the Working-bees, and the Drones.

20. The QUEEN-BEE is the ruler of the hive—and the mother of all the young Bees in it.

A Beehive.

21. The WORKERS are very intelligent and industrious. They form themselves into companies. One division or company roams the fields and gardens in search of food; another builds the cells; another helps those which come back with heavy loads, or feed and nurse the young Bees. All make the most of their time, and of every inch of room, for their house answers both as nursery and storehouse. There are also house-cleaners, sentinels and fighters. Even in a single day they have been known to make 4,000 cells.

22. The royal cell which they build for their Queen, is made much larger than any of the others.

23. When the cells are ready, the Queen lays in them a great many eggs, from each of which comes a larva, grub, or worm (see paragraph 8). The food of bees consists chiefly of pollen and sweet juices or fluids of flowers.

24. The WORKERS have little brushes on their legs which also hold the pollen and otherwise help them in their work. They have feelers or arms which enable them to work and feel their way in the dark. By these feelers they seem to tell one another the news of the day. If the

Queen should die they select a young grub, which soon becomes their Queen. When the Queen and a number of her household agree to emigrate and form a new colony or "swarm," they select a new home, gather food, and make full preparations for the change. After bidding farewell to their brothers and sisters which remain in the old home, they fly away. Those left behind must select a new Queen or they all would die.

25. The DRONES (all males) are very lazy. They collect no honey, make no wax, build no cells. Most of them do nothing but eat honey which the workers collect. So, as winter comes on, the Workers get out of patience with their idleness and fly at them, sting them to death, and at once remove the dead bodies from the hive.

26. The Working-bees live for several years. They are smaller and more numerous than the others. In a hive of 20,000 Bees, the Workers will number about 19,500. There is only one Queen for every hive. The Workers are assisted in building by a gummy or sticky substance which they gather from some trees. A Bee has four wings and six legs, and a kind of tongue or proboscis for gathering honey. All but the Drones have stings.

27. Bees, by going from flower to flower, gathering and mixing the pollen or powder-like substance of flowers, increase the varieties of fruits, flowers and plants, and in this way, also, they are of great advantage to us. This last work seems to be all the HUMBLE BEE is good for. It lays up no store of honey, usually builds in holes in the ground, and lives but one year. It does not associate with the Honey or Hive Bee.

28. The WASP and HORNET are somewhat similar to the Bee. They build and live in little cells of a paper-

like substance, which they make from bark and plants. They have sharp stings, but do not gather honey or make wax like the Honey Bee.

29. ANTS resemble Bees in their habits of order and industry, and in being divided into three kinds, Males, Females, and Workers.

30. The ANT WORKERS have charge of the eggs, cocoons, and young Ants, as well as of the house affairs.

31. If overtaken by a storm, or if their nests should be destroyed, their first duty is to save their eggs or young, and they are seen running to and fro with these little things in their mouths in search of places of safety for them. The workers have no wings; the others have for a time, but soon lose them.

32. The COMMON ANTS are the Red and the Black; some have wings, others have none.

33. Ants of the same family or kind live together in great harmony, and are never weary of helping each other. If one is tired or sick, another will take him upon his back and tenderly carry him.

34. Although these little creatures make no sound, they seem to understand each other perfectly. By means of their feelers they give orders, directions and invitations, call for food, or discuss family affairs.

35. Their little jaws are hard and sharp, serving them as axe, scissors, pincers and sword.

36. Ants come forth in myriads about the first of April. Four or five months of the year that the Ant is supposed to live, some kinds spend in a torpid state.

37. Battles are sometimes fought between the different families or tribes, desperate battles, too; for although of a peaceful nature, they will not submit to imposition. Some are very thievish and do not stop with stealing the food of a neighboring tribe, but they seize also their eggs or their young ones, and carry them into captivity to become slaves to them. Then the injured Ants levy war. They form themselves into companies, battalions, and divisions, and station sentinels as soldiers do. Army meets army, they fight bravely and desperately; they kill and wound each other, punish spies and deserters, carry off prisoners and spoils, and when the battle is over they take care of the sick and wounded.

38. The GRASSHOPPER is of the same order of Insects as the Locust, Cricket and Katydid, having long bodies, four wings, and three pairs of legs. Their food is grass and the leaves of plants.

39. Grasshoppers are of great variety; some are green, some black, and some variegated. Some make a chirping sound and some are always silent.

40. Their hind legs are much longer and stronger than the others, and are admirably fitted for jumping or leaping.

41. It is the male Grasshopper which does all the chirping. He does not, however, chirp or sing as a bird does, with his voice or his throat. He makes his peculiar sound with his wings, and partly, some people say, with his legs and a kind of little drum or cymbal.

42. In the autumn, the mother Grasshopper bores or digs little holes in the ground and lays a great many eggs in them, and on the approach of frost she dies. The eggs remain there all winter and are hatched out by the warm sun of spring. For a while the young ones hop only, and seem to be without wings, but these are really concealed on their sides and appear when the time comes.

43. LOCUSTS are the most destructive of this kind of Insects. They fly in vast numbers, like clouds which hide the sun, and come down on the growing crops of spring as fast and as numberless as snowflakes in a winter's storm.

44. Their visits in Western Asia and Northern Africa are terrible, for they are sure to leave famine and desolation behind them. The Locusts, called also Grasshoppers, which they resemble, have at times done great damage to the corn of some of our Northwestern States and Territories.

45. Locusts are sold in the markets of Europe, Asia and Africa as an article of food.

46. The "SEVENTEEN-YEAR LOCUST" (more correctly called HARVEST FLY) has a thicker body and shorter legs than the Locust or the Grasshopper. It flies, but does not leap.

47. These Insects lay their eggs in the twigs of trees, and then die. From the eggs are hatched, during the same summer, little six-legged worms, so small that it would take sixteen of them to measure one inch in length. These remain in the ground seventeen years, feeding on the juices of roots. At the end of that time they enclose themselves in a shell or case, then crawl up the trunks and branches of trees, to which they cling until their shell or dry skin bursts open; and, finding themselves provided with wings, they fly away.

48. CRICKETS belong to the same order of Insects as the Locusts and Grasshoppers. They can dig underground passages for themselves, and their long hind legs enable them to take long leaps.

49. House Crickets and Field Crickets are deadly enemies to each other; in fact, Crickets generally are very quarrelsome and are always ready for a fight. In Germany, mis'chievous boys get up pitched battles between them, when these warlike Insects kick like horses, butt like rams, and scratch like cats, until one or the other runs away or is disabled.

50. One of the most annoying Insects is the MOSQUITO, which has a long, slender body, six legs, and two wings. It has also a little proboscis for piercing and sucking. This contains several lancets so small and so sharp that together they are finer and sharper than a needle.

51. Mosquitoes are produced from eggs which float on the water. When these are hatched they are little worms and seem to hang from the surface of the water head downward, when they are called "Wigglers." They change their skins several times, then become a kind of Chrysalis in a little case or cocoon, which, like the Caterpillar, they soon burst, and, drying their newly found wings, they fly away into the air in search of food.

52. They find their food in the dew and in the juices of flowers and plants. Some kinds are active by day, others by night. Those which attack man and beast for blood are the females only. The "Wigglers" feed ravenously on the animalcules in ponds and marshes, and thus aid in purifying the water.

53. The eggs become perfect Insects in three weeks, and many broods are hatched every warm season.

54. Mosquitoes infest forests and marshy places in every country and in every climate; in cold Siberia and Lapland, as well as in the hot valley of the Amazon.

55. The GNAT, HOUSE FLY, and OX FLY belong to the same order of Insects as the Mosquito.

56. The DRAGON FLY has a long, slender body and four long, narrow wings.

57. Its thin, crisp wings are as clear as glass, reflecting all the colors of the rainbow, and seem to be in rapid and almost constant motion. While flying, it catches multitudes of Mosquitoes, Gnats, Beetles, Flies, and other Insects.

Blackboard Drawing: Honey Bee, length of body, half inch; Dragon Fly, 3 inches.

58. They are therefore beneficial, and not in the least injurious to man or child (although it bears, in some places, the frightful name of "Devil's Darning Needle").

59. It undergoes changes from the egg to the worm and the chrysalis, in the water, occupying two years. When its wings are ready, it rises above its old home in the marsh or the pool, to fly, shine, chase, kill, eat, and die, all in a single season.

60. BUTTERFLIES, like other Insects which fly, have two long, slender horns or feelers, which they can turn in every direction.

61. When they lay their eggs, they fasten them to some plant or leaf, with a sort of glue of their own making. There they remain until hatched into a kind of worm, which is called a caterpillar if it has legs, or a grub if it has no legs.

62. The Caterpillar eats enormously, grows rapidly, and often changes its SKIN.

63. When about six weeks old it stops eating, and covers itself with a kind of cobweb or cocoon, which it fastens to a convenient branch. There it hangs as a chrysalis, until it bursts the case and sails into the air on beautifully colored wings to spend the rest of its short life in flitting among flowers and blossoms and sipping honey.

64. The microscope shows that the wings of the Butterfly are covered with numberless little scales of every variety of form and color, and that its eyes are composed of a great many smaller eyes.

65. Butterflies generally live but one season, although some live through the winter.

66. The HOUSE FLY has two wings, six legs, a sucking proboscis for taking its food, and two great eyes which are composed of 4,000 small eyes.

67. Its feet are remarkably formed to enable it to creep up smooth surfaces like glass or on ceilings.

68. It holds on by means of a gum or sticky substance with which its feet are supplied; some say it holds on by means of sharp little hooks on the feet; and others say its feet, when pressed against glass or the ceiling, form vacuums, and that the fly is held on by the pressure of the air (as explained on page 119).

69. Most Flies die when frost comes; but some of those which hide away in warm nooks and corners live just long enough to lay a great many eggs the next summer. In a few hours these eggs are hatched into little grubs which, in a few days, become flies.

XXXIX. BRUCE AND THE SPIDER.

FOR Scotland's and for freedom's right,
The Bruce his part had played
In five successive fields of fight,
Been conquered and dismayed;
Once more against the English host
His band he led, and once more lost
The meed for which he fought;
And now from battle, faint and worn,
The homeless fugitive forlorn
A hut's lone shelter sought.

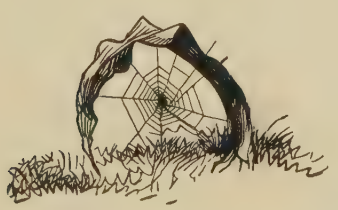
And cheerless was that resting-place
For him who claimed a throne:
His canopy, devoid of grace,
The rude, rough beams alone;
The heather couch his only bed,—
Yet well I wean had slumber fled
From couch of eider-down!
Through darksome night till dawn of day
Absorbed in wakeful thought he lay
Of Scotland and her crown.

The sun rose brightly, and its gleam
Fell on that hapless bed,
And tinged with light each shapeless beam
Which roofed the lowly shed;
When, looking up with wistful eye
The Bruce beheld a spider try

His filmy thread to fling
From beam to beam of that rude cot;
And well the insect's toilsome lot
Taught Scotland's future king.

Six times his gossamery thread
The wary spider threw;
In vain the filmy line was sped,
For powerless or untrue
Each aim appeared, and back recoiled
The patient insect, six times foiled,
And yet unconquered still;
And soon the Bruce, with eager eye,
Saw him prepare once more to try
His courage, strength, and skill.

One effort more, his seventh and last!
The hero hailed the sign!
And on the wished-for beam hung fast
That slender, silken line;
Slight as it was, his spirit caught
The more than omen, for his thought
The lesson well could trace,
Which even "he who runs may read,"
That Perseverance gains its meed,
And Patience wins the race.



XL. KING SOLOMON AND THE BEES.

WHEN Solomon was reigning in his glory,
Unto his throne the Queen of Sheba came,
(So in the *Talmud* you may read the story).
Drawn by the magic of the monarch's fame,
To see the splendors of his court, and bring
Some fitting tribute to the mighty king.

Nor this alone; much had her highness heard
What flowers of learning graced the royal speech;
What gems of wisdom dropped with every word;
What wholesome lessons he was wont to teach
In pleasing proverbs; and she wished in sooth,
To know if Rumor spoke the simple truth.

And straight she held before the monarch's view,
In either hand, a radiant wreath of flowers;
The one bedecked with every charming hue,
Was newly culled from Nature's choicest bowers;
The other, no less fair in every part,
Was the rare product of divinest Art.

"Which is the true, and which the false?" she said.
Great Solomon was silent. All amazed,
Each wondering courtier shook his puzzled head,
While at the garlands long the monarch gazed,
As one who sees a miracle,—and fain,
For very rapture, ne'er[1] would speak again.

[1] Ne'er, *nâre*.

"Which is the true?" once more the woman asked,
Pleased at the fond amazement of the king,
"So wise a head should not be hardly tasked,
Most learned liege,[1] with such a trivial thing!
But still the sage was silent, it was plain
A deepening doubt perplexed the royal brain.

While thus he pondered, presently he sees,
Hard by the casement,—so the story goes—
A little band of busy, bustling bees,
Hunting for honey in a withered rose.
The monarch smiled, and raised his royal head;
"Open the window!"—that was all he said.

The window opened at the king's command;
Within the room the eager insects flew,
And sought the flowers in Sheba's dexter[2] hand!
And so the king and all the courtiers[3] knew
That wreath was nature's; and the baffled queen
Returned to tell the wonders she had seen.

My story teaches (every tale should bear
A fitting moral) that the wise may find
In trifles light as atoms in the air,
Some useful lesson to enrich the mind;
Some truth designed to profit or to please,—
As Israel's king learned wisdom from the bees!

JOHN G. SAXE.

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[1] **Liege,** *leej,* sovereign.
[2] **Dexter hand,** right hand.
[3] **Courtier,** *kōrt'yer,* member of a princely court.

WORDS IN COMMON USE WHICH ARE OFTEN MISPRONOUNCED.

EXPLANATION OF MARKS.

ā as in fāte; ă as in făt. ō as in ōld; ŏ as in ŏn.
ä as in fär; â as in fâir. ū as in ūse; ŭ as in us.
ē as in meet; ĕ as in mĕn. ḡ as in ḡo; ġ as in ġem.
ī as in pīne; ĭ as in pĭn. th as in there; th as in thin.

[These pronunciations are all according to Webster.]

Ab-dō'men, *not* ab'.
Ab'ject-ly, *not* ject'.
Ab-ste'mi-ous, *not* stem'
Ac-cli'mate, *not* ac'.
Acoustics, a-kow'stix, *not* **koo.**
A-crŏss', *not* krawst.
Ad-drĕss', *not* ad'.
Ad'mi-ra-ble, *not* **mī'.**
Adult', *not* ad'ult.
Ad'verse, *not* verse'.
Ad-ver-tise', *not* ad-vert'is.
A'ĕr-o-līte, *not* a-er'.
Again, a-gen', *not* a-gain.
Aġile, ăj'īl, *not* ā-jile.
Al'a-bas-ter, *not* al-a-bas'ter.
Al-bū'men, *not* al'.
Al'ge-brā, *not* brā.
Almond, ä'mund.
Alms, ämz.
Al-păc'a, *not* al-a.
A-nĕm'o-ne, *not* mo'.
Anew, a-nū, *not* a-noo.
Ap-pa-rā'tus, *not* rat'.
A'pex, *not* ap'ex.
Apostle, a-pos'sl, *not* stle.
Apricot, ă'pri-cŏt, *not* ap'.
Aqueduct, ăk'we-dŭkt, *not* duk.
Ar'ab, *not* a'rab.
Ar'a-bic.
Architect, ar'ki-tĕct, *not* **artsh.**
Arctic, ark'tik, *not* ar'tik.
Ar'id, *not* a'rid.
Armistice, är'mis-tis.
Aspirant, as-pīr'ant.
Ath-e-nē'um.
Au-dā'cious, *not* **dash'.**
Aunt, ant.
Bade, băd, *not* bād.
Băr'rel, *not* bärl.
Been, bin.
Begone, gŏn, *not* gawn.
Be-queath', *not* queath.
Bĭ-tū'men, *not* bit'.
Blasphemous, blăs'fe-mŭs, *not* fe'.
Bombast, bŭm'bast.
Bombazine, bŭm-ba-zeen'.
Bouquet, boo-kā', *not* bō.
Bowsprit, bō, *not* bou.
Breth'ren, *not* breth'er-en.
Brig'and, *not* brig-and'.
Bŭr'gun-dy, *not* gun'.
Calf, käf.
Căl'is-thĕn-ics, *not* cal-is'.
Calliope, kal-lī'o-pe, *not* **kal'.**
Calm, käm, *not* kăm.
Ca-nīne', *not* ca'.
Căr'bīne, *not* been.

Cā'ret, *not* **că'**.
Căr-ib-be'an, *not* **rib'**.
Căr'tridge, *not* cat.
Cĕm'e-tĕr-y, *not* try.
Cen-trĭp'e-tal, *not* pe'tal.
Chasten, chā'sn.
Chim-păn'zee, *not* zee'.
Chirography, kī-rog'ra-phy, *not* tshi.
Chŏc'o-late.
Cincinnati, te, *not* **tah**.
Cocoa, kō'kō.
Cŏf'fee, *not* cauf.
Cŏf'fin, *not* cauf.
Col-os-se'um.
Cŏm'bat-ant, *not* **bat'**.
Cŏm'bat-ĭve,
Comely, kŭm'ly, *not* kōme.
Cŏm'mu-nĭst, *not* mu'.
Cŏm'pa-ra-ble, *not* par'.
Con-spĭr'a-cy, *not* con-spĭ'ra-cy.
Cŏr'al, *not* cō'ral.
Courier,. koo're-er, *not* **kur'**.
Cu'po-la, *not* lo.
De-bris, dā-brē'.
Dec'ade, *not* ade'.
Deficit, dĕf'i-sit, *not* **de-fis'it**.
Draught, draft.
Drought, drout.
Dy'nas-ty, *not* **nas'**.
Elm, *not* el'um.
Ewe, yu.
Fi-nance', *not* **fi'**.
Financier, fĭn-ăn-seer'.
Flō'rist, *not* flŏr'.
Forbade, băd, *not* bād.
Gon'do-la, *not* gon-dō'la.
Gov'ern-ment, *not* guv'er-munt.
Grievous, grēv'us, *not* grēv-i-us.
Gri-māce', *not* grim'.
Guä'nō.
Gypsum, jip'sum.
Har'ass.
Haunt, hänt, *not* **hănt**.
Hearth, härth, *not* hurth.
Heinous, hā'nus, *not* **hee'**.
Herb, erb.
Her'o-ine, in, *not* **īne**.
Ho-ri'zon, *not* hor'.
Hos'pi-ta-ble, *not* **pit'**.
Hostler, ŏs'ler.
Hy-drop'a-thy.
I-de'a, *not* i'de-a.
Ig-no-rā'mus.
Il-lus'trate, *not* **il'**.
In-dis'pu-ta-ble, *not* **pu'**.
In'sects, *not* sex.
Inveigle, in-vē'gl.
Is'o-late, *not* i'so.
Juvenile, nīl, *not* **nīle**.
Kiln, kĭl.
Laugh, läf, *not* **lăf**.
Laundry, län'dry, *not* **lăn**.
Leisure, lē'zhur.
Lev-ee', a morning party.
Lev'ee, high bank of a river.
Ly-ce'um.
Ma-ni'a-cal.
Mar'i-time, tim, *not* **tīme**.
Mā'tron, *not* măt'.
May'or-al-ty, not al'i ty.
Memoir, mem'wŏr, *or* me'mwŏr.
Mis'chievous, *not* cheev'.
Mŏn'o-gram, *not* mō-no.
Mū-nic'i-pal, nis', *not* sip'.
Museum, mū-zē'um, *not* **mu'**.
Mush'room, *not* roon.
Mus-tache', *not* mus'.
Ne'er (never), nâre, *not* **neer**.
Neu-ral'gi-a, răl'je-ä, *not* **ral'i-ja**.
New, nū, *not* noo.
Nŏm'ad, *not* nō'mad.

None, nun, not nōne.
Nothing, nuth'ing, *not* nŏth'in.
Obeisance, o-bay'sance.
Ob'elisk, *not* o'be.
Ob'se-quies, *not* ob-se'.
Office, ŏf'fice, *not* au'fus.
Official, ŏf-fish'al, *not* ō-fish'al.
O-le-o-mar'ga-rine, g *not* j.
Ominous, ŏm'i-nous, *not* ō'.
On'er-ous, *not* ō'.
Onyx, ŏ'nyx, *not* ōn'.
Op-pō'nent, *not* op'.
Or'de-al, *not* or-de'al.
Ostler, ŏs'ler.
Ostrich, ŏs-trich, *not* aus'.
Palm, päm, *not* păm.
Pä-pä', *not* păp'pa.
Pā'tron, *not* păt'.
Pecuniary, pe-kūne'yah-re.
Pianoforte, pē-ä'no-for'tā.
Pin'cers, *not* chers.
Piquant, pik'ant.
Ple-be'ian, *not* ple'.
Poignant, poi'nant.
Po-māde, *not* măd.
Pon'iard, *not* poin'.
Possess, pŏz-zes', *not* pō-zes.
Prŏd'úce, *not* prō'.
Prŏg'ress, *not* prō'.
Psyche, sī'ke.
Pur-sūe', *not* soo.
Py-ram'i-dal.
Quar'rel, *not* quărl.
Quay, kē.
Quoit, *not* quāte.
Reptile, tīl, *not* tīle.
Ro-mance', *not* ro'.
Ruffian, ruf'yan.
Săc'ra-mĕnt, *not* sāke.
Salmon, sam'un.
Sanguine, sang'guĭn, *not* gulne
Sar-sa-pa-ril'la, *not* sas.
Satyr, sā'tur.
Sau'cy, *not* sas'e.
Saunter, sän'ter, *not* sawn'ter.
Sau'sage, *not* sas'.
Schism, sizm', *not* siz'um.
Sergeant, sär'jent.
Servile, vīl, *not* vile.
Sī'ne-cure, *not* sin'.
Sĭr'up, *not* sur.
Soften, sof'n, *not* ten.
Squā'lor, *not* squä.
Stŏl'id, *not* sto'.
Stū'dent, *not* stoo.
Stū'pid, *not* stoo.
Sub-dūe', *not* doo.
Su-per'flu-ous, *not* flu'.
Supple, sup'pl, *not* soo'pl.
Tâs'sĕl, *not* taw'sl.
Taunt, tänt, *not* tănt *nor* tawnt.
Trib'une, *not* tri'.
Trousseau, troo-sō'.
Tū'lip, *not* too'.
Tūne, *not* toon.
Typhus, ti'fus, *not* pus.
Un-in'ter-est-ing, *not* est'.
Ve'he-mence, *not* ve-he'.
With, *not* with.
Withe, *not* withe.
Yacht, yŏt.
Zō-ol'o-gy, *not* zoo-ol'.

Take care to distinguish between **lie** and **lay, sit** and **set, in** and **into.** When you **lay** the book on the table, then the book **lies** on the table. When you **set** the chair at the table, you may **sit** down on it. Water is **in** the pitcher; pour some of it **into** your glass.

ADVERTISEMENTS

AMERICA FIRST

By JASPER L. McBRIEN, A. M., School Extension Specialist for the United States Bureau of Education, Washington, D. C., and formerly State Superintendent of Public Instruction of Nebraska.

TO INSTILL patriotism into the hearts of the rising generation is one of the greatest privileges of every school teacher. For it is chiefly to the teachers of America that the duty comes of amalgamating into one loyal, patriotic whole all the children of this country, whether they are the offspring of parents who were born here or of parents who come from other lands. Material which the teacher can definitely work toward this end is necessary and in this new book, "America First," this need is adequately met.

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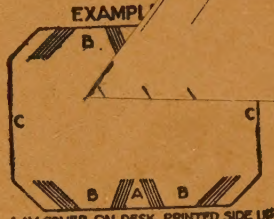

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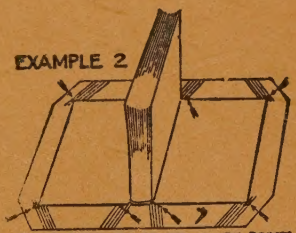

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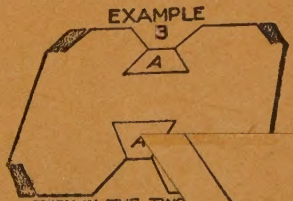

TURN IN THE TWO

YOU FINALLY FINISH THESE

ys you only enter another, a larger, school, self is but a school. We are ever learning orld's school of experience, whether we will or important, then, that we continue to learn to pose. But, speaking after the manner of the Good ow shall they learn without a Teacher?" and who nue to inform, counsel and guide? To whom shall we for "light and leading," and for the "glad tidings of gs" which shall make the way surer and the days better r through the years?

ewspaper, the true newspa- honest newspaper, the news- aper of your choice and confidence. nd what makes a good newspaper? First of all, it must print "all the ews" that interests intelligent peo- e—the news of the city, the state, e nation, the countries of the world. It must be an active influence for ood in the community. It must be dependent and impartial in both s news and its editorial opinions. must support those who seek the ommon good. It must oppose those ho selfishly sacrifice the public ood.

It must be interesting—interest- g in at least some of its pages to very member of the family—to ther and mother and every child d enough to read. News is always nportant—though in varying de- ree—but not for that reason alone it necessarily interesting to every- ody. Editorial opinions may be im- rtant, but not therefore of neces- always interesting to all read- ut life, life in all its different ties, is always interesting, fferent ways, to every- . Some things interest people more than interest others. *very*body is in- ted in the ac- es of *some- some- e*, and

the good newspaper will therefore so "cover" the day's doings, the world over, that its every reader will say of it, "that's an interesting paper."

And not only must the good newspaper print the news—"all the news;" not only must its influence be for the public good; not only must it be "an interesting paper," but, withal, it must have the saving grace of humor—American humor. After the strenuous day comes the evening hour of rest and quiet and content—the hour of healthful reaction from "the cares that infest the day," the hour when the smiles and chuckles and laughs which brighten and gladden the printed page remind us that "a little nonsense now and then is relished by the wisest men." A good laugh is a tonic to good health. A good newspaper should have a good many laughs in it—or at least a batch of smiles.

And finally, the good newspaper betokens and reflects the good people who read it. It is an economic principle that the character of a man-made product is determined by the character and demand of its market—of the people who buy it. A good newspaper is made to meet the expectations of good people. It should therefore be a matter of distinct satisfaction to Chicagoans that the London Chronicle, one of the great English newspapers, has said, "The Chicago Daily News is by far the best evening newspaper in the world."